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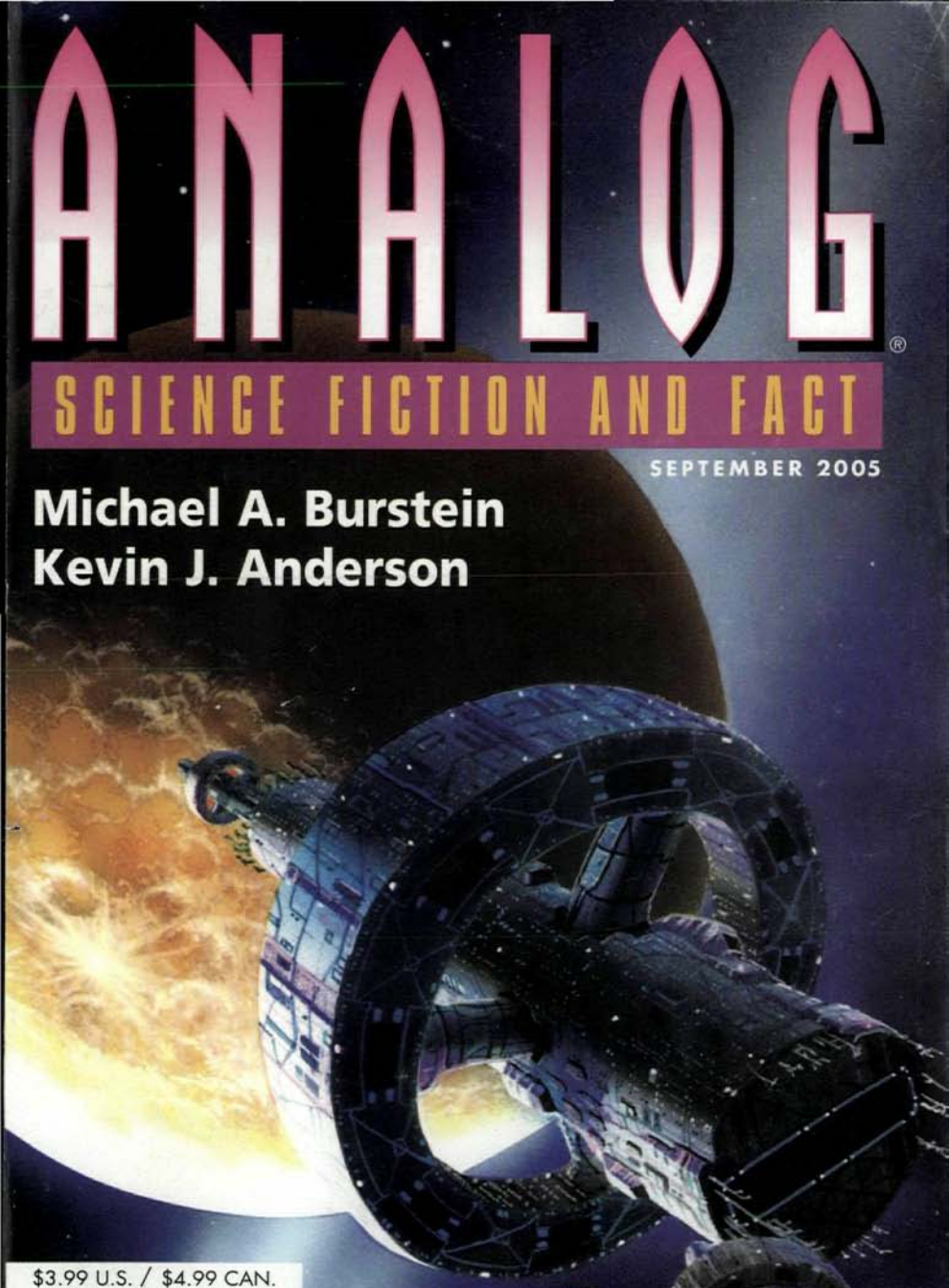

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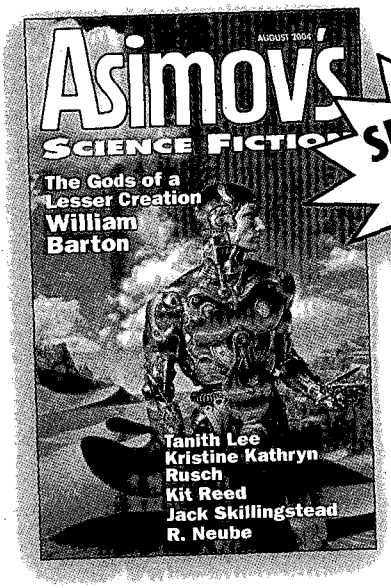

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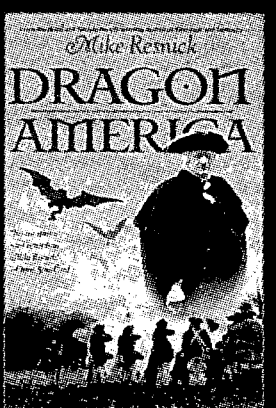

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Vol. CXXV No. 9
September 2005

Next Issue on Sale
August 8, 2005

46

54

NOVELLA

SANCTUARY, Michael A. Burstein ____ 8

NOVELETTES

SEARCH ENGINE, Mary Rosenblum ____ 85
GIVE UP THE GHOST, Grey Rollins ____ 98
RESONANCE, Eric James Stone ____ 112

SHORT STORIES

TAKE ME TO YOUR LIEDERKRANZ, Lawrence M. Schoen ____ 43
BREEDING MAZE, Larry Niven ____ 46
THE SPEED OF UNDERSTANDING, Carl Frederick ____ 54
THE BEST-LAID PLANS, Jerry Oltion ____ 71
PARADOX & GREENBLATT, ATTORNEYS AT LAW, Kevin J. Anderson ____ 76

SCIENCE FACT

WATER WORLD, GLACIER WORLD, DUST WORLD, Kevin Walsh ____ 36

READER'S DEPARTMENTS

THE EDITOR'S PAGE ____ 4
IN TIMES TO COME ____ 75
THE ALTERNATE VIEW, Jeffery D. Kooistra ____ 67
THE REFERENCE LIBRARY, Tom Easton ____ 132
BRASS TACKS ____ 138
UPCOMING EVENTS, Anthony Lewis ____ 144

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Indicia on Page 5

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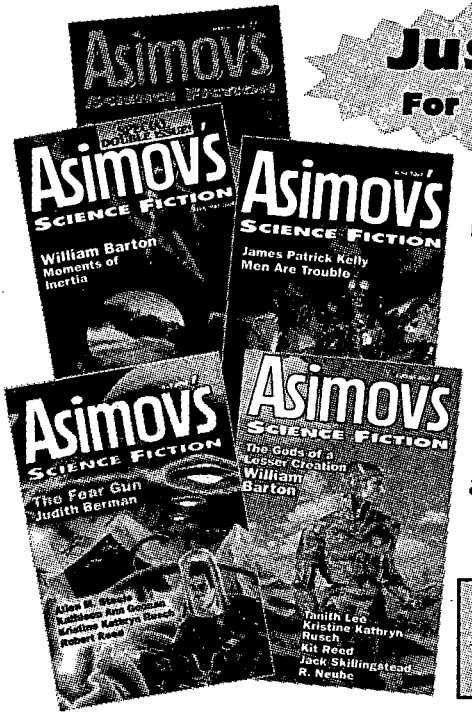

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EDITORIAL Stanley Schmidt

SOFTENING US UP

The next time you're waiting in an airport security line, try this thought experiment. Imagine the you of twenty years ago—i.e., around 1985—being offered a glance through a time machine at the scene in which the present you is now participating. You're not told what's going on. You can't see your own face, so you don't recognize yourself, and you have no reason to react personally to what you see. Nor can you read any signs, badges, insignia, or similar information in the scene. So what do you say when somebody asks you, "What do you see happening here? And where do you think it is?"

I submit that the chances are very good that you'd guess Russia, East Germany, or some unidentified police state. Consider what you see, without what you now know of its context: a crowded checkpoint with several kinds of scanning machinery, swarming with uniformed men and women scrutinizing every individual in the long line coming through. Each would-be passenger is required to show the same identification to several officials, and to relinquish his or her luggage, wallet or purse, coat, and shoes. All of those things are x-rayed, and one or more of the uniforms opens and rummages through many of them before returning them to the owner. Some passengers walk through the scanner without tripping an alarm, but many don't—some of those scanners are *very* sensitive!—and are called aside for additional indignities ranging from wand scans to patdowns to strip searches. Anyone unlucky enough to have inadvertently packed some horrible weapon like a pair of fingernail scissors is likely to have it confiscated, or perhaps be given the option of returning to the lobby to pack it up and mail it home—and going through the whole process all over again.

All of this would have been quite unthinkable for most Americans twenty years ago, even though we had already gone a *little* bit down this road. Everybody knew this sort of thing went on in "those other countries," but we all knew it couldn't happen *here*. The suggestion that it could, or might ever need to, would have filled most of us with righteous indignation and revulsion.

Now it seldom does. Quite likely you read my opening paragraphs and thought, "What are you ranting about? All these procedures are *necessary* now, for security. Get over it!"

And that's precisely my point: by steps large and small, we have gradually been conditioned to accept as "normal" things that just a few years ago would have seemed beyond the pale for rational consideration.

And the process is still going on, in ways both official and unofficial.

Okay, maybe at least some of these changes *are* necessary, at least temporarily. But they represent such radical departures from the principles on which this country was founded that we should be very conscious of what we're doing when we accept them. We should

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not let ourselves be softened up so we readily accept large and dangerous changes just because they occur in relatively small stages, or appear to be justified by special circumstances, which in turn also come to be accepted as "normal." We should, in other words, go into any drastic changes with eyes wide open and fully aware of what we're doing.

In the case of increased government security, we are told that these extreme measures are needed because of the clear and present danger of terrorism. Right after the 9/11/01 attacks on New York and Washington, this sounded all too convincing. In what amounted to a state of national panic, people accepted, even welcomed, these measures—and then others. Extreme airport security? Sure. Indefinite "detention" (a newfangled euphemism for "imprisonment") of people suspected of maybe being dangerous, with no time limit or requirement for a trial? Why not, if that's what it takes? Invade another country because it might in some vaguely envisioned way eventually be dangerous? You bet. Fingerprint anybody coming into our country? Push for fingerprinting all of *our* citizens when they apply for a passport? Ban photography around airports or subways, even though such a ban will be impossible to enforce consistently and unlikely to have much effect beyond annoying and entrapping unsuspecting tourists or railroad buffs?

Not all of these things have been fully implemented, but some of them have and the rest are under serious consideration in at least some places. All of them, not many years ago, would have been seen by most Americans as hallmarks of a totalitarian or police state. Yet in that short time we have been conditioned to accept them as normal actions that must be taken, at least "for the duration," to protect democracy. But we have no indication of what "the duration" is, or how far we can go in this direction without having thrown away the very thing we're supposed to be protecting. So far we've continued to practice and expand them on the basis of official assurances that continuing threats make them necessary—but very few of us have any way of directly confirming that claim. So we have to take officialdom's word for it—and the more such measures we've already accepted, the easier it becomes to get us to accept still more. Far be it from me to suggest that anybody so far has been tempted to exploit that fear and trust to establish and maintain an Orwellian "*1984*" situation, but we must take very seriously the possibility that somebody *could*.

My point is merely that no matter how necessary such measures may be *now*, the willing acceptance of them softens us up—makes us increasingly vulnerable to possible future attempts by someone to take them well beyond the necessary. But government actions

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are not the only things that can, intentionally or unintentionally, have that effect. There are cultural forces, driven by technological developments, pushing us in the same direction.

Consider, for example, the current popularity of "blogging." Its closest counterpart until quite recently was "journaling," or keeping a diary, which many people regarded as a very private thing—a book in which they could record, primarily for their own use, thoughts and feelings that they might not feel comfortable sharing with many others. Blogging, short for "web logging," is similar, except that instead of being done in a private book, it's done on a website where anybody at all can read it. Personally, I marvel at the ego of people thinking that strangers would *want* to read every detail of their personal lives, and even more at the fact that many of them do find plenty of readers. Voyeurism, it seems, is alive and well, and some of the most enthusiastic bloggers go well beyond simply talking about themselves. Some live huge portions of their lives in front of webcams, letting anyone who cares to watch what most people (so far) would consider their private business.

Some even go beyond conducting their own lives on "candid camera," and extend coverage to others who are offered no choice. Some bloggers who are also parents are now running blogs that they use for such purposes as looking in on their offspring when they themselves are at work or otherwise elsewhere—and posting huge galleries of pictures of "cute actions," logs of diaper changes, etc. All of which is available to anyone who cares to look at or download it. This probably doesn't bother babies, but babies grow up. How long do parents continue these things, and how does it affect the kids who are subjected to it when they get old enough to be aware of what's going on? No doubt some of them will be extremely embarrassed, and some of those may manage to put a stop to it—though they still risk humiliation when somebody calls up an old bath photo or diaper tally in front of a teenage boyfriend or girlfriend.

Or maybe the practice will affect them quite differently. Maybe kids brought up this way will be so used to continuous surveillance that they won't even realize there's an alternative and won't make much distinction between Mom and Dad doing it and Big Brother

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doing it. Particularly when their growing environment also includes many other variations on the theme. There's already a considerable business in other paraphernalia for parents to spy on kids, from software to record everything they do on a computer for later parental scrutiny, to gadgets for constantly monitoring their whereabouts by means of GPS readings transmitted by their cell phones or the cars they drive. At least one company specializes in "nannycams," cameras that can be hidden in teddy bears or the like to let absent parents spy on babysitters and their charges; a recent newspaper article was devoted to the ethical question of whether parents using such devices should tell the nannies they were doing so.

Nannycams lead us to the increasing prevalence of various forms of workplace spying on adults, including the use of various forms of cameras and eavesdropping on telephone and e-mail conversations. Nobody says "eavesdropping," of course; the politically correct euphemism is "monitoring," and so many noble-sounding excuses have been made for it that even some of the employees are beginning to believe them and accept such practices as a normal part of the working world. That, too, has the effect of softening us up, making us more receptive to continuous intrusive supervision. If some such steps become widely accepted, then it's easy to accept others that go a little further. If that happens often enough, we can easily arrive at a situation very much like that in *1984*, even if nobody set out with the conscious desire to create such a state.

And if adults can be made susceptible by small steps, beginning from a state of high resistance at a fairly advanced age, just imagine how much more susceptible they would be if they had been subjected to even closer and more continuous surveillance from such an early age that they're conditioned from the start to regard it as "normal." That, it seems to me, is happening to large numbers of children right now. And I suspect it's likely to become even more prevalent as the electronic exhibitionists who *like* parading their own lives and those of their children before the world exert social pressures on those who don't.

In Orwell's vision of *1984*, we are led to believe, the nightmare world of Big Brother was created by deliberate intent and maintained by consciously designed social machinery. The real danger we now face may be much more insidious: a similar world that arises not by malicious design, but simply by "growing" in a series of small steps, each of which seems too innocuous, and perhaps even reasonable, to protest. ■

Just think of the tragedy of teaching children not to doubt.

—Clarence Darrow

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Sanctuary

Michael A. Burstein

Appropriate behavior depends on circumstances, which means appropriate ethics differ with time and species. Which can make for some very thorny dilemmas. . . .

"Frankly, if you think about it, any creatures on any other planets, subject to the same laws of physics and chemistry as us, made of the same kinds of atoms, with an awareness and a will recognizably like ours, would be at the very least our cousins in the cosmos. They would be so similar to us in all the essentials that I don't think you'd even have the right to call them aliens."

—Brother Guy Consolmagno, SJ, *Brother Astronomer: Adventures of a Vatican Scientist* (2000)

The alien entered the chapel just as Father Wickham was reciting the Doxology. As the door clanged open, the thirty Catholic parishioners turned their heads to the back of the room. The sound echoed through the chapel, until finally it faded, leaving nothing behind but curious whispers that ran around the chamber like mice looking for a place to hide.

Father Wickham recognized the alien as a member of the Stanquel, the insectoid-looking race that was a minor member of the Alliance of the Free Cultures. Representatives of most member alien races had visited the space station's chapel when the station had first been completed, but Wickham could not recall any of the aliens actually dropping by during services.

No matter; staring at the alien was unseemly. Wickham pulled his own gaze away and cleared his throat, causing the parishioners to look forward again and quiet down. He continued the Doxology in a louder voice than usual, wanting to bring his flock's attention back to the Mass. ". . . Through Him, with Him, in Him, in the unity of the Holy Spirit, all glory and honor is yours, almighty Father, for ever and ever."

Unfortunately, the presence of the alien still seemed too disruptive for the community. Rather than shouting out the great "Amen" that customarily fol-

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lowed the Doxology, the parishioners mumbled out separate amens in embarrassed tones.

Wickham had to retake control of the service. Looking directly at the alien, he said, "It is time for the Communion rite. Friends, at this time I wish to remind you all about the significance of Communion. It is an outward sign of the unity among Catholics and while anyone is welcome to attend our Mass, it would not be appropriate to take Communion unless you are a baptized, practicing Catholic in union with the Church and free from serious sin."

For a brief moment, he wondered if he was coming off as a pompous fool, but then he saw the congregation nodding in agreement. One man—Commander Bill Hamill, second-in-command of the station and one of the most devout Catholics Wickham knew—then bowed his head, and others followed suit.

Wickham glanced one more time at the alien, who was slowly making its way forward into the chapel. He looked back at his parishioners and spoke in even, measured tones. "Let us pray with confidence to the Father in the words our Savior gave us."

Then, along with his parishioners, Wickham began reciting the ancient words of the Lord's Prayer: "Our Father, who art in heaven, hallowed be thy name; thy kingdom come; thy will be done on earth as it is in heaven. Give us this day our daily bread—"

Wickham paused. The alien had slid onto one of the benches, next to Laura McKenna, an engineer Wickham knew well. Although everyone on the station was accustomed to the presence of aliens, Laura looked distinctly uncomfortable.

Wickham continued reciting, speeding up a bit to catch up with the congregation. As he spoke, he watched Laura slide away from the alien, who pressed closer. "And forgive us our trespasses as we forgive those who trespass against us; and lead us not into temptation, but deliver us from evil."

The congregation fell silent, and Wickham continued. "Deliver us, Lord, from every evil, and grant us peace in our day. In your mercy keep us free from sin and protect us from all anxiety as we wait in joyful hope for the coming of our Savior, Jesus Christ."

At the name of the Son, the alien glanced up briefly and the congregation concluded the prayer: "For the kingdom, the power, and the glory are yours, now and forever."

The time had come for the Sign of Peace. Despite the awkward presence of the alien, Wickham pressed on.

"Lord Jesus Christ," Wickham began, and again the alien paused and looked up, "you said to your apostles: I leave you peace, my peace I give you. Look not on our sins, but on the faith of your Church, and grant us the peace and unity of your kingdom where you live for ever and ever."

The congregation responded, "Amen."

"The Peace of the Lord be with you always."

"And also with you."

"Let us offer each other a sign of peace."

The parishioners turned to each other, shook hands, and softly spoke wishes of peace to each other. The alien sat in its spot, its front appendages crossed together, as the others ignored it. Wickham, being a man of God, caught the alien's eye and nodded.

The alien returned the nod. It unnerved Wickham; he felt unsure as to whether or not looking at the alien had been a good idea. He tried to catch Commander Hamill's eye, to get some sort of cue, but Hamill's face remained impassive.

The time had come for the breaking of the bread. Wickham nodded to John Mulroney, in the front row, and the young doctor stood up from his seat and joined Wickham in the front of the room to assist with the Communion ceremo-

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ny. Although Wickham liked to spread this honor around, Dr. Mulroney had done this before, and for the moment Wickham preferred familiarity.

As they prepared the wafers and the wine, Wickham led the congregation in speaking aloud:

"Lamb of God, you take away the sins of the world: have mercy on us.

"Lamb of God, you take away the sins of the galaxy: have mercy on us.

"Lamb of God, you take away the sins of the universe: grant us peace."

Wickham looked at his congregation and pointedly ignored the alien; this was not for it.

"This is the Lamb of God who takes away the sins of the world," Wickham said. "Happy are those who are called to his supper."

"Lord," replied the parishioners, "I am not worthy to receive you, but only say the word and I shall be healed."

Wickham checked the tray with the wafers and the wine, and then spoke the next sentence in as resonant a tone as he could manage. "All who would wish to receive communion, please step forward."

People started to do so, but suddenly the alien jolted forward to the front of the line, and the parishioners gasped.

Taken aback, Wickham studied the alien more closely. Although the Stanquel did have an insectoid appearance, that was only because of the way they evolved on their planet of lighter gravity and dimmer light. That gave them spindly limbs and large green eyes, which contributed to their praying mantis appearance. They grew far too large to actually be insects; even Wickham knew enough biology to understand that.

Most Stanquel stood quite a few centimeters taller than the average human, but this one was just about Wickham's height. Like most of its race, it wore a light-colored tunic and pants, which contrasted with its dark, hairy-looking skin. And its abdomen appeared distended, unusual for its race.

"Friend," Wickham said as gently as he could, "this ceremony is not for you. Please sit down."

The alien shook its head, and began speaking with a variety of clicks and whistles, which its translator pendant handled with ease. "I doubt I could even metabolize the wafer," it said.

"All the more reason," Wickham noted, "for you to sit down."

"But, Father Wickham," the alien said, "I need to speak to you of a matter of utmost importance."

So the alien knew his name. Still, this was not the time. "It must wait."

"It cannot."

"Would you allow one of us to so casually interrupt one of your religious services?"

"My question for you is of a religious nature."

Puzzled, Wickham found himself asking, "You have an interest in Catholicism?"

The alien hesitated, then said, "Yes."

Wickham shook his head and tried to hide his amusement. "Even if this were the time, I cannot convert you to Catholicism. I would be more than happy to discuss religious matters at another time."

During this conversation, the members of the congregation had remained still. Finally, Commander Hamill moved forward. "Excuse me, Father, but what is this all about?"

"Just a misunderstanding, Bill."

Hamill turned to the alien. "Is that so?"

"In a way—" began the alien.

"Because if there's a problem, I can get station security down here *tout de suite*."

The alien stared at Hamill for a second, then suddenly began shuffling around in a small circle and making clicking noises. Hamill's comment had obviously agitated it.

"That will not be necessary—" it started.

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"Then," Hamill interrupted, "will you please take a seat until the service is finished? Some of us have religious obligations to attend to." He grabbed the alien by the shoulders and stared directly into its eyes. "You're a Stanquel, so I know you understand what that means."

The alien gazed at Hamill for a few seconds more, while Wickham waited. Finally, the alien nodded and began moving towards the seats in the front row, still close by.

Wickham let out a sigh of relief, then turned to face Hamill, who had taken the position at the front of the line. Wickham reached for the first wafer—

And once again, the heavy door to the chapel clanged open. Two of the Alliance's finest, a sergeant and a corporal, with weapons at the ready, ran into the chapel.

Wickham felt a sudden chill. The parishioners looked to him for guidance, their faces registering surprise and agitation. Even Commander Hamill began stepping into the background.

"Bill? What are you doing?"

"I don't want to let the soldiers know I'm here yet. Let's see what business they think they have disrupting our service before siccing the second-in-command on them."

The sergeant approached Wickham, while the corporal began walking towards the now-seated alien. "Father, my name is Sergeant Byers, and I'm here with Corporal Clayburgh. We're very sorry to disturb your service, but we need to take this alien into custody. Won't be a minute."

For a moment, Wickham just stood still, staring at the sergeant in shock. Then he jumped over to the corporal and raised his arms with his hands outstretched. "Not here," Wickham said. "You have no right."

The corporal stopped and Byers said, "Father, you're mistaken. We have every right."

"Not without due process, Sergeant. You must show your warrant."

Byers sighed. "We don't have to show the warrant to you, Father, just to the one we're arresting. However, if it makes you feel any better—" He handed over a small tablet.

Wickham scrolled down the tablet while the soldiers waited. The warrant's only sentence authorized the arrest of the alien—named Zwaren—for violations of Stanquel law.

Wickham handed the tablet back. "The warrant does not state the charges."

"It doesn't have to. We're making this arrest on the authority of the alien's own government, not on the authority of either Earth or the Alliance. Special favor to their ambassador. Now if you'll excuse me, I'm going to do my job."

Byers began moving towards the alien, who suddenly pulled back. "Let me speak to the priest!" it shouted.

Byers stopped short, and Wickham slowly moved in front of him. "Sergeant, the alien interrupted our service before in order to speak with me. We didn't have a chance to finish our conversation. May I talk to it for a moment before you take it away?"

"I'm sorry, Father, but my orders state specifically that the Stanquel do not want the alien speaking with any of our religious leaders. It's why we barged in when we did."

"Are you a religious man, Sergeant?" Wickham asked softly. "If you were about to be arrested, wouldn't you want the comfort of speaking with a member of the clergy beforehand?"

Byers glared at the priest, but Wickham could see in his eyes that the argument had gotten through. "Fine," Byers said, "but I'm sticking close. You have one minute."

Wickham approached the alien, and Byers stayed three paces behind, keeping his right hand near his holster. When he got to the front row, Wickham took a seat next to the alien. He put a hand on its shoulder, which felt chitinous to the touch, hard and smooth.

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"Now, what's this all about?" Wickham asked.

The alien did not answer, but turned its gaze forward, where Byers and Clayburgh stood, watching.

Wickham suppressed a sigh. "Gentlemen," he said, addressing the soldiers, "would you please back off the tiniest bit? I assure you that the alien isn't going anywhere."

The soldiers took two steps back. Wickham leaned towards the alien and whispered, "I think that's as far away as I can get them to move. Now tell me, what's going on?"

"Father Wickham, what do you know of my race?"

"Not as much as I'd like," Wickham admitted.

"That is a shame," the alien said.

Wickham shrugged. "Perhaps. But that's not the issue. Why did you interrupt my service? Why are the soldiers after you?"

"Because I'm pregnant," the alien blurted out.

Well, at least Wickham now knew the alien's sex. "Really? As my friend Rabbi Binyamin would say, *Mazel tov*."

The alien cocked its head. "Pardon? The translator did not parse that."

He smiled. "I said congratulations."

"I think I see. I would say thank you, Father, but it is the pregnancy that necessitates I seek your aid. My father desires to force an abortion upon me."

Wickham felt suddenly queasy. "Force an abortion?"

"All of my people are born as identical twins, and by our religious laws, only one of each pair of twins is allowed to mate and bear offspring. My sister has already done so. But I rejected my race's laws and became pregnant, and now my people want me to terminate my pregnancy."

"I see," Wickham said slowly. "But why have you come to see me?"

The alien cocked her head. "You are a Catholic priest, are you not?"

"Well, yes."

"And therefore you are opposed to the killing of an unborn child. Or unborn children, such as my twins."

Wickham cleared his throat. "Well, yes. But that's assuming the baby has a soul."

"I do not understand."

"Shortly after human beings encountered the first aliens, the Pope called a special conference, Vatican 5, to discuss how to deal with the issue. The Church decided that it would be inappropriate to proselytize among our alien brethren. Do you understand the implications?"

"No."

Wickham sighed. He knew his words might offend the alien, but he had no choice. "According to Vatican 5, only human babies are considered to have souls before birth. We don't make pronouncements regarding aliens. As the Church has always taught, we have the competence to discuss the behavior and conditions of human beings, but we can make no definitive statements about non-humans."

"I see," the alien said, clasping her hands together. "May I assure you that my babies have souls?"

Before Wickham had a chance to reply, Byers stepped forward. "Okay, Father, have you heard enough? I know I have."

"I—I am not sure."

"Well, I am. Now that you know what this is all about, let me do my job." He reached out to grab the alien's right arm, but the alien pulled away.

"Father, you can't let them take me," she said. "I know your religion believes in the sanctity of life before birth. I have studied your kind."

Wickham pulled the alien aside. "Zwaren, what you say is true, but I can't take your side."

"You must."

"I've already explained. The Vatican has made strict rulings on our interactions with alien races."

"Is not your Pope an alien?"

"He was born on Mars," he said with

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a smile. "It isn't the same thing."

"Is there nothing you will do for me?"

"Of course there is, Zwaren. Look. Go with the soldiers. When I finish ministering to my congregation, I will come find you and try to help you out. See what I can do later. But for the moment, all I can do is pray for your unborn children. I can't do much else."

"Yes, you can." The alien looked at the soldiers for a moment, then lowered her eyes. "I am formally requesting sanctuary."

Wickham felt a cold chill in his chest. "What?"

"I am formally requesting sanctuary," the alien repeated. "It is my right."

"Um—" Wickham began, but was cut off by Byers.

"Enough already," Byers said. "Let's go."

He reached out and grabbed Zwaren's arm with his hand. But as he did so, Wickham grabbed Byers by the shoulder.

"Just a moment," Wickham heard himself saying.

Byers glared at him, but did not loosen his grip. "What is it now, Father?"

"The alien has requested sanctuary. I cannot refuse."

"What are you talking about?"

To Wickham's relief, Commander Hamill suddenly stepped forward. Clayburgh stood at attention, as did Byers, while keeping his grip on the alien's arm.

Hamill addressed Byers. "Sergeant. Let the alien go while Father Wickham explains."

"Yes, sir," Byers replied. "But if it makes a move . . ."

Hamill nodded and turned to Wickham. "Explain."

Wickham swallowed; the welcome interruption had given him the time to gather his thoughts. "Sanctuary is an old concept—somewhat outdated, but still valid. It's a special right that a person can request of the Church, to be kept safe from harm, often used by people fleeing religious or other forms of persecution."

Byers's eyes lit up with understanding. "Oh, I see. Kind of like using a church as an embassy."

"Well, not quite. But you sort of have the idea."

"Still doesn't make complete sense, though," Byers said. "I mean, this whole station is like an embassy. She has no reason to come here."

Commander Hamill cleared his throat. "With all due respect, Sergeant, the station is not an embassy. After all, each race maintains its own embassy on the station. The station merely serves as neutral territory."

"And if the station were an embassy," Wickham gently pointed out, "you wouldn't have the authority to arrest her, would you?"

Byers narrowed his eyes. "As you point out, Father, I do have the authority to arrest her. So I'd appreciate it if you'd understand that your religious beliefs don't apply in this situation."

"On the contrary, we're in my Church."

Byers glanced around, the disbelief evident on his face. "This isn't your Church, Father."

Wickham smiled. "Really? Well, I see my congregation here waiting patiently. I still have wafers and wine to distribute for Communion. This is my Church."

Byers rubbed his eyes. "Oh, hell," he said quietly.

Wickham stiffened, and pointed firmly at the holo-crucifix projected above the stage. "I will thank you not to use profane language in a house of the Lord."

"A house of the—Father, please be reasonable. I have my job to do."

"And I," Wickham said, staring directly into the soldier's eyes, "have mine."

Clayburgh shifted his weight from one foot to the other and suddenly spoke up in a gravelly voice. "Sergeant, what do we do?"

Byers glared at Clayburgh and turned

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to Hamill. "Commander?"

Hamill looked around. "Yes, Sergeant?"

"Father Wickham is preventing me from making an arrest. Shall I take him into custody along with the alien?"

"Absolutely not. In fact, I order you to leave the alien alone."

Byers shook his head. "With all due respect, sir, our orders come directly from Captain Pamona. Chain of command."

Hamill nodded. "Chain of command, yeah." He frowned. "Still, as long as the alien is kept within the chapel . . ."

"Sir?"

Hamill turned to the other soldier. "Corporal Clayburgh?"

"Yes, sir?"

"Stand guard outside the door."

"Sir, I'm supposed to assist Byers."

"You will be. You're keeping the alien inside while I go talk to the captain." He raised his voice so as to address the congregation. "Friends, there's a small security matter that needs attending. Please leave the chapel at once. We'll let you know when we'll have Communion."

A few of them began murmuring, but Wickham raised his hands.

"Friends, it is as Commander Hamill says. May peace travel with you, but please do go."

With a susurration, the people filed out of the chapel, until the only ones remaining were Wickham, the two soldiers, Hamill, and the alien.

"Well, Sergeant," Hamill said, "let's go talk to the captain."

"Yes, sir."

As Clayburgh and Byers moved outside, Hamill held back. He beckoned Wickham over to him, and Wickham followed him to the door.

"Father?"

"Yes, Bill?"

Hamill shook his head and smiled. "*Sanctuary?* I hope you know what you're doing."

As the door clanged shut, Wickham softly replied, "So do I."

* * *

With the soldiers gone, Wickham felt an urge to call back his flock. The last time a service of his had been disrupted was back on Pardo's Planet, during a hostage situation in which he later admitted that he should have gone with his instincts. Wickham tried not to dwell on the past; in the days afterwards, the Church had quickly found a replacement for him on Pardo's Planet and assigned him to Grand Central Station. At the time, he had felt that perhaps the Church had sent him to the one parish in the universe with the fewest Catholics, because there he could do no harm. After all, what impact could a priest have on a station composed mostly of non-Catholic aliens?

Wickham was afraid that he and the Church were about to find out.

"Father?"

Wickham came out of his reverie, to see the alien still sitting in the front row. Wickham loosened his collar and attempted a small smile. "Well," he said. "I need to put away the wafers and the wine. Why don't we talk?"

"About what?"

The priest chuckled. "About sanctuary, for one thing. I seem to have put my reputation on the line for you, not to mention my job and perhaps my career. You owe me the courtesy of telling me what for, especially since granting sanctuary is no longer the custom of the Church."

"Yes," Zwaren replied. "Since the end of the eighteenth century, counting by the years of your Lord. Approximately five hundred of your Earth-years ago."

Wickham paused in his task of gently packing away the Communion wafers. "So you knew. And yet you still asked for it?"

"I took the gamble that no one else would know, and that the one who did know would still feel honor-bound to grant my request."

Wickham laughed and scratched his head. "Gambling is a sin, you know."

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"Only for money. I was gambling for the right to live by my beliefs."

"I was afraid of that. From what Sergeant Byers said, it sounded as if you're running from your own people."

"In a manner of speaking. I am running from some of them."

Wickham nodded as he finished putting away the wine. He grabbed a folding chair from the stage and sat across from the alien.

"So if you're running from other Stanquel, why come to me? Why didn't you go to the Earth embassy? They'd have better resources to protect you, you know."

"They would not wish to violate the Treaty of the Free Cultures."

Zwaren did not elaborate, and it took Wickham a moment to get it. "Oh. You're a criminal?"

"According to one definition, yes. Some might say that protecting unborn life is never a criminal act, even if one must resort to murder."

A cold chill went through Wickham. "Um, have you?" he asked.

"Resorted to murder?" The alien chittered in an unnerving way. "No, of course not. You must realize that. If murder had been my crime, the soldiers would not have accepted your authority to keep me safe here in your church."

"Technically, it's not a church, it's a chapel."

"By whatever word you use, this is a place of worship. And I do know that murderers would find no sanctuary here."

Wickham thought back to his college history classes. "I'm not sure that's entirely correct."

"So if the soldiers had told you I was wanted for murder, would you still have interceded as you did?"

Wickham stared into the alien's eyes. "You have a point. I probably would not have. Of course, there is a difference between sanctuary and the confessional. If you had confessed to your crime, rather than asking for sanctuary, I could have absolved you of it."

"I sincerely doubt that. I am not Catholic."

Wickham considered that for a moment. "Occasionally, non-Catholics come to the confessional to unload their sins. It can have a calming effect."

"But would your God accept my confession?"

Wickham hesitated, then shook his head. "Only if you accepted His grace."

"Which, as you pointed out, your own Church will not allow me to do."

Wickham cleared his throat. "The Church doesn't deny you the right to accept God's grace, friend Zwaren. The Church simply cannot accept aliens as Catholics."

"So if I did accept your God as my own, I would be entitled to all of the responsibilities, but none of the privileges?"

Wickham rubbed his eyes; he could feel the beginnings of a headache. "I don't understand. Are you saying you *want* to convert to Catholicism?"

The alien chittered. "Not necessarily. But anything that would put one more obstacle between my people and the murder of my unborn children I would gladly do."

"And you see conversion as a means to that end?"

"Because of the full faith and credence clause, yes."

Wickham shook his head. "But it's not that easy. Even if you were a human who wanted to become Catholic, you'd have to undergo a rigorous program of study and training. You couldn't just come to the Church and have us admit you as a member. We'd have to be convinced that you understood and accepted all the precepts, not just the ones convenient to your situation."

"I can recite the Catechism, if you like."

Wickham smiled. "No, no, that won't be necessary."

"So what do we do now?"

"We wait," Wickham replied. "Per-

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haps I can find someone to bring some stuff from my quarters."

Zwaren looked around the chapel and then back at Wickham. "You do not live here?" she asked.

"No, I don't." He rubbed his eyes again and stifled a yawn. The slight headache had become sudden exhaustion. "Like I said, this isn't a church. It's a multi-denominational chapel. If it were my church, I'd probably live in the rectory. But here on Grand Central Station, I have quarters, just like everybody else."

"Because of me, you cannot go home." She paused. "I—I am sorry."

"Don't worry about it." Wickham chuckled. "You're more than paying me back by relieving the tedium. There's not really much for a priest to do here on the station. Not many life cycle events get celebrated here. I run the Masses, but that's about it."

"Life cycle events?"

"Marriages. Deaths. Births."

"These things don't happen on the station?"

"Well, they do," Wickham admitted. "At least, there are deaths. But most people getting married prefer to do it on a planet, among friends. And most women having children also prefer to be on a planet, rather than on a space station."

"Why?"

He shrugged. "Sentimental reasons, I suppose. No one wants his or her birth certificate to refer to an artificial place that may one day cease to exist."

"But even planets must cease to exist, eventually."

"Like I said, sentimental reasons." He stood up and stretched his muscles. "I don't know about you, Zwaren, but I think I'm going to spend this time reading the Psalms." He looked at her. "You're welcome to join me if you wish."

"I—I have my own holy writings, which I would like to read."

"Suit yourself."

The two of them sat in chairs on opposite sides of the stage, and they read.

Like most people living on Grand Central Station, Wickham knew of Captain Rachel Pamona, who ran the place for the AFC. Pamona tended to stay in the background, making sure that things ran smoothly enough so no one would notice that there was actually a major job involved. Wickham had been to a few station events where Pamona was present and had even spoken to her a few times; being on close terms with Bill Hamill had gotten him that much. But none of that prepared him for her arrival at the front door of the chapel.

The door intercom buzzed. Wickham carefully placed the Bible's red ribbon between the pages he had been reading, closed the book, and walked over to the door. He pushed a button. "Yes?"

"Father Wickham? This is Captain Pamona. I'd like to come in and talk."

Zwaren put down her book and ran to Wickham's side. "Father, is this it? Is she planning to take me away?"

Wickham released the button. "I don't know. She simply said she wanted to talk."

"I don't trust her."

"Go hide behind the curtain, if it will make you feel more comfortable."

Zwaren trotted back to the stage, climbed upon it, and pulled the tan curtain closed. Wickham waited until the curtain stopped rustling, then pushed the button again.

"Captain?"

Suddenly the door clanged open and Pamona stood there, a soldier crouched by her side.

"How in the world—" Wickham began.

"Override code," Pamona said.

"Oh," he said.

"Well? Aren't you going to invite us in?"

"I would have thought you would have barged in by now."

Pamona smiled; the soldier's face re-

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mained impassive. "Diplomatic protocol," she replied. "You have an alien with you who requested sanctuary. It wouldn't look good for me to just barge in with a soldier, without first getting your permission." She paused. "But I wanted you to know that I could have."

Wickham nodded. "I appreciate the respect you're giving me."

She laughed. "I'm not giving it to you, Father. I'm giving it to the rules of diplomacy, and to the treaty that formed the AFC. And, frankly, I'm also giving it to my second-in-command."

"Bill's a good man."

"Yes, he is. And he's a good advocate, for which you'd better be very grateful the next time you see him. He was very clear on what I should and shouldn't do when I told him I was coming down here."

"So you haven't come here to arrest Zwaren?"

"Not yet, anyway. I give you my word on that."

Wickham gestured with his arm. "Then you may come in."

Pamona and the soldier crossed the threshold into the chapel. The soldier pulled a small clear pistol out of a holster, and Wickham tensed up.

"Captain," he said.

Pamona looked at the soldier. "Private Sperry, at ease."

"But ma'am—"

"Yes, I know. It's for my protection. Still, I doubt that the alien is going to swoop down upon me. More likely she's frightened and hiding somewhere, perhaps behind those curtains."

Pamona's more perceptive than I realized, Wickham thought.

Sperry returned the pistol to its holster, and nodded at Pamona. "Well?" Pamona asked Wickham.

Wickham nodded and called out, "Zwaren, it's okay. Captain Pamona just wants to talk."

Slowly, the curtain spread apart, and Zwaren descended the stage.

"I have already met with Captain Pamona."

"You have?" Wickham asked, surprised.

"Yes. We have nothing else to discuss."

Wickham looked at Pamona. "Forgive me for saying this, Captain, but I thought you'd be too busy to meet with every alien that comes through Grand Central."

In response, she laughed again. "Normally, yes. But some aliens are more equal than others." She paused. "Has Zwaren given you the sob story about her children yet?"

Wickham furrowed his brow, upset at the cavalier way Pamona seemed to dismiss Zwaren's problem. "Yes, she has. It seems like a legitimate grievance to me."

"Father," Pamona said, "I don't know if you realize what's going on. It's not just Zwaren. And do you even know who Zwaren is?"

"Should I?"

"Her father is the Stanquel Ambassador to Grand Central, the one who ordered her arrest."

Wickham slowly turned his head to stare at Zwaren, who stood motionless. "Zwaren? Why didn't you tell me this?"

"Would it have mattered?" she asked.

Wickham felt an urge to shout, "Hell, yes!" but he refrained.

"I'm not sure," he said, "but I would have liked to have known."

Pamona cleared her throat. "As I was saying, it's not just Zwaren you're dealing with here."

"Yes. I'm apparently also dealing with her father."

"No," Pamona said. "You're not just dealing with her father either." She paused. "Zwaren is a heretic, one of a movement led by some charismatic member of her race. She's not here on her own initiative; she volunteered to be used as a test case. And now she's using you."

Wickham turned to Zwaren again. "Is this true?"

"I love my unborn children," she

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replied. "It would be murder to abort them."

"That was not my question."

The alien clicked her mandibles. "It is partly true," she said.

"Which part? The part where you're a member of a heretical movement, or the part where you're using me?"

Zwaren clicked her mandibles again, apparently weighing her response to his question. Finally, she said, "Abapater is no heretic. He speaks the truth."

Wickham noticed that she had not answered the second part of his question, but ignored that. "Please don't tell me that your followers are all hovering outside the chapel door, waiting to barge in at your signal."

She chortled. "No, Father, you are safe. I am the only one of Abapater's followers on the station. The rest used to live on our home planet, although a great number—in fact, most of us now—have migrated to our colony worlds."

"Who is this Abapater? What does he say?"

"Abapater is a high leading priest."

"A priest? Such as myself?"

"He would be more akin to your Pope. He leads our movement."

"The Catholic Church is not a movement," Wickham pointed out.

"Once it was, is that not right?"

Wickham hesitated, then nodded in agreement. "But I don't think I would equate the Pope with your Abapater."

"True. Abapater is more like the one who created your religion, not the one who leads it now."

Pamona interrupted. "Enough of this. Father Wickham, here's the deal. Zwaren is a criminal by the laws of her people. Furthermore, she's the daughter of the Stanquel ambassador, who insists along with the rest of his government that we turn her over to their custody." She sighed. "So, tell me, will you accept my authority over the station, including this chapel? After all, this isn't really a church." She paused. "Or do I have to fight you on this?"

"Captain, in any other situation I would accept your authority without question. But in this particular case, I can't. Your authority is secular, not religious. And Zwaren appealed to me on religious grounds. I cannot refuse her."

"That's what I was afraid you'd say." She sighed. "You know, I could order the soldiers to arrest both you and the alien."

"That would violate our charter rights to freedom of religion."

"I could argue that point, but Bill would probably lead a mutiny." She smiled wryly. "You're putting me and the AFC into a rather precarious position here."

"I'm sorry for that."

"I'm sure you are," she said without irony. "So, Father Wickham, if you won't accept the authority of the captain of Grand Central Station, who would you listen to?"

Wickham had been thinking about this very question, and he was ready with his answer. "The AFC Commander of Chaplains."

Pamona frowned. "You'd need me to go that high? Isn't there a bishop in charge of this sector of space?"

"Archbishop Peter Grace of Pardo's Planet is in charge of this sector of space, at least as far as the Catholic Church is concerned. But I don't think he would have the experience to understand the situation I've been thrust into." Wickham felt uncomfortable disclosing the real reason he didn't want Pamona consulting Grace.

"Still, shouldn't we go to him first?"

Wickham smiled. "Suppose he rules in either my favor or yours? Do you think that the other one would just accept his decision? Or wouldn't we just request an appeal? We might as well go straight to the top."

Pamona chuckled and shook her head. "Point taken, Father. Very well. But you do know that it's going to take a while to tightbeam a message to the

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Commander of Chaplains, and then we'll have to wait for his response."

"Her," Wickham said automatically. "Jacqueline Axelrod."

"Her, then," Pamona said. She sighed. "Well, I guess we've done all we can here for the moment. Come, Private."

Pamona turned around and headed towards the door, with Sperry close behind. Just as she reached the door, Wickham cleared his throat. "Captain?"

Pamona stopped and turned to look at him. "Yes?"

He smiled. "Be thankful that I didn't ask you to go to the Pope."

"It won't come to that," she said. "Or at least, it had better not."

As soon as Pamona and the soldier had left, Zwaren had fled behind the curtains again. Wickham sat in one of the pews, picked up his Bible, and resumed reading.

Wickham read through the entire book of Psalms and had turned to Ecclesiastes when the alien emerged from the curtains. She settled into one of the seats.

"They will return, I assume?" she asked.

As before, Wickham carefully marked his place in the Bible with the red ribbon. He rubbed his eyes and sighed. "Most definitely. But not for a while yet, I imagine." He paused. "Are you ready to talk again now?"

She hesitated, then said, "Yes."

He nodded. "You should have told me the full story from the beginning. It was unfair of you to force me to make my decision the way you did."

Zwaren stopped chittering. "I did not have the time to explain fully. The soldiers would have taken me away in the middle of your service." She finally looked up at him. "You yourself know that."

Wickham considered for a moment, then said, "You certainly had time before Captain Pamona arrived. You could have filled me in after the initial excitement. I didn't appreciate being surprised."

She bowed her head. "Father? Would you accept an apology from me?"

"Well, it would be a start. But let me share one piece of advice from our holy writings. 'The truth shall make you free.'"

"On the contrary, the truth seems to have trapped me here."

Wickham had no reply for that. "You know," he said, "this custom your people have of allowing only one twin to bear children seems to make some sense to me."

Zwaren swiveled her head around and stared directly into his eyes. "How do you mean?"

Wickham shrugged. "Well, it's a matter of biology. If every member of each generation gave birth, your population would increase exponentially. Within a few generations, your race would use up all its resources and die out." He paused. "It seems to me that you've got a good balance going."

"I did not take you for either a scientist or a historian of my people."

"Historian?"

"What you describe is what almost happened before our prophet Barden established our system of beliefs. He told us that God had set up the restriction on childbirth. He showed us how our uncontrolled growth, natural though the impulse might be, would eventually lead to the destruction of our race. He pointed out that our Creator would not have meant for us to destroy ourselves, as we were created in God's image. And within two generations, all Stanquel were followers of Barden's dicta."

Wickham whistled softly. "Sounds like the Stanquel are more rational than we are, in some ways."

"Perhaps," Zwaren replied. "But keep in mind that I am only giving you a small picture, and that comes from a long time ago. Today most of my people still cling to the restrictions imposed upon

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us by Barden. Even when it contradicts the standards of rationality."

"Explain."

"The restriction on childbirth may have made sense when we were confined to one planet. Overpopulation would have destroyed our resources. But now that we can live among the stars, there is no longer a reason for this proscription."

"No longer a reason?"

"Precisely. The law no longer serves the function it once did. Abapater has pointed that out to my people, yet most refuse to listen."

Wickham thought for a moment. "Zwaren, let me tell you a story about our own beliefs. We base a lot of what we do on a book of laws and stories. We call it the Bible."

"I am familiar with your terminology."

Wickham waved it off. "Just listen, please. Many years ago, the Catholic Church found itself in an argument with one of humanity's greatest scientists, a man named Galileo Galilei. Galileo was the first of our race to train a telescope upon the stars. He discovered the moons of our nearby planet Jupiter, the spots on our Sun, the craters on the Moon, and so forth. He also promoted the idea that the Earth went around the Sun and not the other way around."

Zwaren chittered. "Your race once thought that your star orbited your planet? How ignorant."

"There's no need to be insulting."

Again the alien bowed her head. "My apologies, Father. But by my race's records, we have always known about the true and proper motion of our planet."

"Well, to be fair, so did we. Thousands of years before Galileo, a Greek scientist named Aristarchus also said that the Earth moved around the Sun. But his was not the prevailing view, and for a long time it faded into obscurity."

"What eventually happened?"

"Eventually, other scientists began rediscovering the theories of Aristarchus. They realized that the geocentric system had irresolvable difficulties in its formulation, and searched for something better. A man named Copernicus was one of the first to suggest that the Earth went around the Sun, but he cited Aristarchus's works as an earlier explanation of the same idea."

"So did people start to accept the idea?"

"Not at first. But Copernicus did help usher in what we later called an Age of Enlightenment, and Galileo played a large role in that. He was very clever in some ways, though. He knew that the prevailing beliefs were held by the educated, which mostly meant priests and other officials who could read the church language, known as Latin. So instead of publishing in that language, he brought his ideas to the common people, by publishing in his native language, known as Italian."

"Sounds like a reasonable tactic."

"His tactics were good," Wickham agreed, "but his strategy was rather unwise."

"How so?"

"He challenged the Church at every turn, and made their officials out to be fools in front of their own followers. Eventually, the Church put Galileo on trial and forced him to recant his beliefs. Of course, within a hundred years they were teaching Galileo's system in their own schools, but it took a few hundred more years before they finally admitted that they were wrong in putting him on trial in the first place."

"So does the Church accept Galileo's findings today?"

Wickham nodded. "Of course we do. It would be ludicrous to believe otherwise."

Zwaren closed her eyes for a moment and wrung her hands together with a faint scrubbing sound. Then she opened her eyes, looked directly at Wickham, and said, "It is interesting to learn more of your human history, Father Wickham. But I am unsure why you chose to tell

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me this particular story."

"I told you this story to make my point."

"Which is?"

"That perhaps it is unwise for you to follow Abapater."

Zwaren pulled herself up as straight as possible. "On the contrary, you make the point that following Abapater is the right and proper thing to do."

"No, I don't."

"But you do. You say that the Church, your Church, persecuted Galileo for his beliefs, and that his beliefs ended up proving correct. By analogy, am I not in the place of Galileo? Does not your argument favor Abapater over the establishment?"

Wickham sighed. "Zwaren, yes, Galileo was right, but at the wrong time. And that is my point. At that time he was a dangerous subversive, a heretic."

"I don't understand."

"Galileo was once asked about the fact that his concept of the universe appeared in direct opposition to what was taught in the Bible. He replied that God had given us two books, the book of nature and the book of scripture, and that we had to use our minds to interpret them both."

"That sounds reasonable to me," Zwaren allowed.

"Except that when further pressed about the dichotomy between his theory and official church teachings, he replied that this was a terrible quandary for the Church."

"It would appear to have been, yes."

Wickham shook his head. "You don't understand. The Church and our teachings were a foundation for morality, for proper behavior towards our fellow human beings. Suppose that Galileo had gotten as far as he did with his religious philosophy as he did as a scientist. Every Catholic would have found it fit and proper to question all of the Church's teachings, and not just those on cosmology. By tugging on the one string that he did, Galileo could have caused the whole structure to come tumbling down."

"Would that not have been better in the long run?"

Wickham paused and gave his reply considerable thought. Ignoring what he hoped was an unintentional insult, he said, "No, it would not have. The Church was the mainstay of literacy and philosophy for a thousand years. If all the lay people had gone Galileo's way, they would not have just rejected the Church's authority on scientific matters. They would have rejected our authority on all matters, including moral and spiritual ones. The chaos that was being held off by the merest thread would have overwhelmed humanity, and the dark ages would have gone on for another thousand years."

"But Galileo was right. You have said so yourself."

"Yes, Galileo was right, but I truly believe that he was right at the wrong time." He placed a hand on Zwaren's shoulder and spoke gently. "Isn't it possible that the same, or worse, holds true for Abapater?"

Zwaren stood up suddenly and began pacing around the room. "I am not sure how to respond."

"Take your time, Zwaren. I imagine I've given you a lot to think about. At least, I hope so."

Zwaren chittered. "That you have. Father, this is the first time I have ever felt seriously challenged in my beliefs, since I began following Abapater."

"Does that mean you're considering going back to the ways of your father?" Wickham asked. He tried to keep the hope out of his voice; it would be an easy solution to both of their problems.

Zwaren took a moment to reply. "No," she finally said. "I will not go back to the ways of my father. My situation is different. This is not about the dead past of your people. This is about the living future of mine."

"Zwaren, you can't throw out the writings in your holy books just because

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circumstances are different. One of the reasons we have religion is to guide our morality, to aid us in making decisions about the new challenges we face in the world."

"We are not throwing out our holy books, Father Wickham. We merely choose to reinterpret them, as our ancestors have done before us. Just as you Catholics have reinterpreted your own religious beliefs over the centuries."

"But reinterpretation must be done slowly and carefully, by the people who know."

"What about the Protestant Reformation? Didn't they claim to know?"

Wickham spoke his next sentence coldly and hoped that Zwaren's pendant would translate his tone as well as his words. "Zwaren, do not come to a Catholic priest for sanctuary and then justify your actions by comparing them with the Protestant Reformation."

"I—I did not think. I am sorry. Please attribute my comment to my emotional state."

Wickham nodded. "Your apology is accepted."

"Father, you know I'm not doing this lightly, and not just to cause trouble. I studied your religion, your beliefs. If I were not an alien, I would ask you to convert me. As it is . . ."

"Yes?"

"I can only ask you to respect me."

The two of them sat in silence, the only sound the soft hissing of the air vents. Finally, Wickham said, "I always respect it when someone acts upon the conviction of their faith and beliefs."

"Thank you," Zwaren said.

The silence hung in the air for a long time. Finally, they both went back to their reading.

Sunday night faded into Monday morning, and Wickham awoke to a buzz at the door. He knew who would be there. Sighing, he lifted himself off the floor and walked over to the door.

The door opened, and in walked Rabbi Samuel Binyamin, smiling.

"Lester," he said.

"Sam." Wickham paused. "I see you didn't bring your congregation with you."

Sam shrugged. "And what would have been the point? So long as you're here, the chapel's serving one religion only. We can't use it."

"Sam—"

Sam lifted up his hands. "Relax, Lester, I'm not here to harass you. Lord knows both our people have had enough of that."

"Then why have you come?"

"To talk. Maybe to convince you to vacate the chapel?"

Lester chuckled. "I thought you said you weren't going to harass me."

"Harass, shmarass, so long as I get you to do what I want."

The two friends glared at each other for a moment, then broke out into raucous laughter. Wickham's laughter turned to a choking cough, and Sam slapped him on the back a few times until he could breathe normally again. "Thanks."

"You're welcome."

"I meant for the laugh."

"So did I." Sam glanced around the chapel. "Um . . ."

"Are you looking for something?"

"Well, frankly, yes. I'm looking for the alien. I was hoping to meet her."

"She hasn't been too interested in talking with visitors."

"But she is here, right? I mean, this isn't all a hoax you've dreamed up to keep the chapel to yourself?"

Wickham smiled, and pointed to the door near the stage. "She's in the kitchen, getting some sleep."

"In the kitchen?"

Wickham shrugged. "It's the only room connected to the chapel."

"Kind of cramped, though."

"She sleeps standing up."

"Oh." Sam took a few steps towards the kitchen door, then settled into one of the seats at the end of a row. In a mo-

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ment, Wickham joined him, sitting in a seat across the aisle.

"I guess I'll pay my respects later."

"How're the other clergy doing?"

Sam sighed. "Well, Sridhar and Ahmed are a little agitated, but Chang is calming them down. And the Protestants are just shrugging this off and holding services wherever they can."

"Really? Hm. Could you speak to everyone on my behalf?"

"Sure, I'd be happy to."

"Thanks, Sam."

After a pause, Sam cleared his throat. "You know, I looked up this concept of sanctuary."

"Oh?" Wickham asked.

"Yes. It sounded similar to the Jewish concept of the *ahrei miklat*, cities of refuge."

"Cities of refuge?"

He shook his head. "Don't you ever read the Torah anymore? It's in Numbers. If a person committed manslaughter, he could run to one of the cities of refuge and live there. The idea was to prevent a vendetta between two families over an accidental death."

"What about a murderer?"

"A murderer wouldn't be allowed refuge. He'd have to be returned to the proper authorities."

Wickham sat quietly for a moment, then said, "I don't think that has anything to do with sanctuary."

"No, it doesn't. That's what I was trying to tell you. I found out a few interesting facts about sanctuary." He cleared his throat and pulled out his electronic pad. "To begin with, it says here that sanctuary is based on the 'inviolability' that is connected to all sacred things." Sam lowered the pad and looked around the chapel. "I'm not quite sure how 'sacred' this space really is."

"You use it too," Wickham pointed out mildly.

Sam nodded. "So I do." He scrolled through the text, at times muttering aloud: "Code of Theodosius . . . papal sanction given in 460 . . . earliest mention in England under King Ethelbert . . . ah."

"What is it?"

"It says here that right to sanctuary was originally confined to the church, but that after a while, the limits were extended to up to a mile away." He looked up. "Couldn't you argue that you can make the whole of Grand Central Station a sanctuary for the alien? Then the two of you could leave this room and open it up for the rest of us again."

Wickham shook his head. "The moment I do, Captain Pamona will declare open season on Zwaren. I've already established this space as the sacred one; I doubt I could get away with extending it any further."

Sam nodded. "Yeah, I probably wouldn't want to live with sanctuary crosses at the ends of the station either. So let's scratch that idea."

"You have another?"

"Yes, well, one that you're not going to like. It says here, and I quote: 'A fugitive in England who was convicted of a felony and took sanctuary was given protection for thirty to forty days, after which he had to leave the kingdom within a specified time and take an oath not to return without the permission of the king.'"

"So? We don't have a king."

"No, but we do have a head of the station. This seems to imply that sanctuary can only be granted for a limited time, and then the fugitive can be forced to leave."

"Zwaren can't leave the station, Sam. Where would she go?"

"Home, perhaps?"

Wickham shook his head. "She'd be arrested and forced to abort her children."

"Not if she gave birth to them within the time she was in sanctuary."

Wickham felt his blood turn cold. "I hadn't even thought of that," he whispered.

"Aren't you glad I'm here? Do you know how long the Stanquel gestation

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period is? She may have timed things just right."

"I'll find out. In the meantime, go on." He pointed at Sam's pad. "What else did you learn about sanctuary?"

"Well, I found out that you're lucky that Hamill's second-in-command. Apparently, if he violates the protection of sanctuary, you have the right to excommunicate him."

"Really? I didn't know that."

"Well, what else do you expect to stop the authorities? It's not like the Church ever had its own standing army to threaten invasion."

"Actually—never mind. Have you got anything else to share?"

"Just one final point, Lester, and I don't think you're going to like it." Sam smiled. "Sanctuary was abolished in the eighteenth century. So tell me, my friend, what are you trying to pull?"

Wickham realized that his friend wouldn't be smiling if he were actually challenging him. Still—"You haven't told Captain Pamona, have you?"

"Me?" Sam looked pained. "Are you kidding? Let her do her own research. The last thing I want to do is give the secular authorities another reason to mistrust us religious ones."

"Bless you, my friend."

"And a *zei gezunt* right back at you."

"I don't know that one."

"It's Yiddish. Be healthy. But have you considered being healthy back in your own quarters?"

Wickham sighed. "She came to me *here*, Sam. If she had come to see me in our offices, or even my quarters . . ." He trailed off.

"You'd probably have a harder time justifying sanctuary in your quarters."

"Perhaps you're right. But at least I wouldn't have inconvenienced all the other religious folk on the station."

Sam looked away for a moment. "Well, Lester, I'm not going to lie to you. Your using this space in this way is most definitely an inconvenience to the rest of us. And it could be taken as offensive."

"How so?"

"The charter for the station clearly grants full respect and rights to this room for *all* religions. That means that no one of our religions can claim a higher justification than any other. By doing what you're doing, you're approaching the fine line where you're promoting Catholicism as more right than any other faith—and you know where that can lead."

Wickham thought of recent history and shuddered. "I know, Sam, I know. But a person—a fellow living being—came to me for the help that only I could provide. What would you have me do?"

The rabbi smiled and let out a long breath of air. "Just what you're doing now, Lester. That's what I would have you do." He lifted himself out of the chair and brushed dust off his sleeves. "It's okay. My people will find another room for the time being. As will the Muslims, the Buddhists, and everyone else on the station. You do what you have to do."

Wickham nodded. "Thank you."

Sam grasped the priest's hand in a firm handshake, then held it tightly and appeared to study his face. "Just be careful," he said. "You don't know what you're dealing with here."

Those final words lingered in Wickham's mind for many hours after Sam had left. He considered his situation thoughtfully as he picked up the Bible and flipped through it, searching the parables of Jesus for any guidance on dealing with aliens wanting sanctuary. He didn't expect to find anything, and he didn't.

Nor was Sam's suggestion helpful. A quick conversation with Zwaren confirmed that she wasn't actually due to give birth for many months now. It was doubtful that the two of them could occupy the chapel for so long.

"And even if I managed to give birth

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to both children without special protection," Zwaren pointed out, "we'd have nowhere to go. Since I am the twin who is never supposed to have offspring, my people would consider my babies to be soulless. They would kill my children in the name of our God."

Wickham's stomach turned queasy. "Murder children?"

"Not murder. Simply kill. It is our way."

A question came to Wickham's mind. "Zwaren? If your people are so intent on making sure that you never reproduce, why don't they simply sterilize you at birth? It would be a lot less brutal than killing your children."

"Our prophet Barden pondered this very question," Zwaren replied. "But he said that God wanted both twins to be free to make the choice ourselves. Only if we were free to reject having children would we be able to demonstrate our fealty to our Creator."

"So once your sister had made the choice to have children . . ." Wickham began.

"My faith in God would have led me to choose otherwise. But my faith, as you know, is based more on the teachings of Abapater, and not Barden."

Station time faded into the night shift, and Wickham set up his cassock as a pillow to keep him comfortable in one of the seats. Zwaren was content to stand on the stage with a thin blanket found in an attached storage closet. Slowly, the two of them drifted off to sleep . . .

A klaxon blared in Wickham's ears, knocking him out of his dreams. He bolted out of his seat, surprised to discover that the station wide alarm had gone off. He looked around groggily; the chapel was bathed in a reddish glow.

"Zwaren?" he called out, rubbing his eyes.

The alien scampered over to him. "Father? What is it? What's going on?"

"I have no idea," Wickham said. "Quiet." He listened carefully as the alarm repeated over and over, the same signal: three short bursts, three long ones, and then three short ones again.

Dear Jesus, he thought. Aloud he said, "I've never heard that one before."

"What does it mean? And do not prevaricate; your face displays terror."

He hesitated, then said, "It means that the station is under attack."

"Under attack? By whom? How?"

"I don't know!" Wickham shouted. "I'm just a priest!"

"How can we find out?"

"They usually announce something over the station television or network systems. Let's see if we can get the news."

Wickham hurried over to the intercom on the wall next to the main door. Just as he was about to turn it on, it buzzed, and he heard Captain Pamona's voice. "Father Wickham?"

"Um, yes, Captain? We heard the alarm. Is everyone all right?"

"For the moment. But I thought you ought to hear this. And please turn on your visual feed."

Wickham pushed a button, and the monitor turned on. Pamona's face appeared on the screen; her normally neat hair clumped around her head, and her eyes appeared bloodshot. "Watch this recording."

She flicked a switch and her image disappeared, to be replaced by that of a Stanquel sitting on the bridge of a spaceship.

"Captain Pamona, this is Commander Shodron of the Stanquel vessel *Nestwood*. I have orders to fire upon your station if the fugitive Zwaren is not remanded into Stanquel custody. You have one standard Alliance hour to comply."

The recording cut off, and Pamona got back on the line. "I don't like being woken up like this, Father. Not at all."

"I apologize, Captain, but I can't be held responsible for this."

She cleared her throat. "We shall see. In the meantime, I'm sending down two officers to take Zwaren into custody. We can't afford to play your games any

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longer."

"I resent that, Captain. This is not a game."

The captain paused. "I think Commander Shodron is making that quite clear. The station's defense system went on automatic when it detected an unexpected ship with active weapons. I've had to deal with panicky people all over the station, and it's all because of you and your new friend."

"Captain—"

"Save it, Father. I'll see you in the morning."

"Captain!" Zwaren shouted.

Pamona rolled her eyes. "Yes, what is it?"

"Commander Shodron would not attack the station while my father is on board."

"I have no way to verify that, Zwaren, and I have the lives of a half-million sentients to consider."

Zwaren appeared to undergo a deep internal struggle for a moment. "Captain," she said, "you may not be able to verify that, but I can. Please connect this intercom with my father."

Wickham raised his eyebrows. "Zwaren, are you sure you want to do this?"

"No, I am not sure," she said suddenly. Clicks and whistles spat out of her mouth as the pendant translated. "I do not wish to speak with my father at all. But I have no choice, if I must convince you and Captain Pamona that their threat is an empty one."

"You're asking me to disturb the ambassador?" Pamona asked.

"No, Captain. I am asking you to disturb my father."

Pamona closed her eyes for a moment. "Zwaren, I can risk my life, but I can't risk those of anyone else on the station. If he doesn't confirm your story to me—"

"He will."

"Very well," Pamona said. She paused. "He's going to be real pissed. I hope you know what you're doing."

"I hope so too," Zwaren said softly.

The screen went dark and Wickham glanced at Zwaren. He wanted to offer support, but no words came to mind.

The screen lit up again, this time split into two images: Captain Pamona on the right, and Ambassador Prazon of the Stanquel on the left.

"Captain," Prazon said, "I object to this interruption."

"Ambassador, I deeply apologize, but by now you've heard the alarm. Your people are threatening to attack the station unless we hand over your daughter."

"You mean the fugitive. I did warn you about this, Captain."

"Yes, you did, Ambassador. However, before I arrest her and turn her over, she has requested to speak with you."

"What?" He uttered a string of untranslated words. "Do you always force official government representatives to be made available to common criminals?"

Pamona smiled. "Actually, yes, Ambassador. After all, your office is responsible for the welfare of all of your citizens that pass through Grand Central, criminal or otherwise."

"Then let her speak to someone in my office."

"That's what I'm doing, Ambassador."

Prazon closed his eyes for a moment, then opened them up again. "Very well. But I insist upon a private consultation." Prazon put his hands on the lanyard that kept the translator pendant around his neck, and began lifting it over his head. "Zwaren, remove your pendant."

"But, Father—"

"Remove it or I shall not talk to you."

Slowly, Zwaren complied. Wickham watched and listened as the two aliens began talking in their incomprehensible language of chitters and clicks. Then he noticed that Zwaren was waving to him gently, trying to signal him without letting her father see. She was dangling the pendant in her hand.

Wickham walked over to Zwaren,

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stood just outside of the range of the monitor, and held out his hand. She tossed him the pendant. He caught it, held it up to his ear, and listened as their rapid-fire sounds became human speech.

"How dare you accuse me of lying!" Prazon was saying.

"If you are complicit in Commander Shodron's threats, then you are lying," Zwaren replied. "You know as well as I do that Shodron will not attack the station so long as you are here."

"How do you know I am still on the station?"

Wickham tensed up when he heard that, but Zwaren appeared to remain calm. "You are very funny, father. If you were not still on the station, no power in the Universe would have convinced you to speak with me."

"Of course I am on the station. But I refuse to assist you in any way."

"You know as well as I do that the *Nestwood* will not attack. Their threat to the station is an empty one."

"Captain Pamona does not seem to think so. She believes that the *Nestwood* will attack, and her belief will lead her to take you into custody and hand you over. Why should I not let this happen?"

The rapid chittering stopped. When Zwaren finally replied, her chitters were softer, as was the voice emerging from the pendant. "This was your idea, Father, was it not?"

"You know me well."

"Better than you know me." She paused. "Father, if you do not call off the *Nestwood*, I will ask Captain Pamona not to arrest me until the deadline passes and at least one shot is fired. Since both you and I know that will not come to pass, we will be at a standstill."

Prazon chortled. "You, a fugitive, will ask the captain to refrain from defending her station? A military leader would never give in to such a request."

"She will if I go through Father Wickham. And you know for a fact how easily the humans defer to their religious leaders. After all, the captain has deferred to her station's priest, and here I am, under their protection."

Wickham gulped down his desire to speak up and object. He thanked God that Pamona couldn't understand this conversation.

"You are bluffing," the ambassador said.

"No. You are bluffing, and I am countering. As soon as Pamona sees that the deadline has passed and the *Nestwood* has not fired upon the station, she will know that the Stanquel make empty threats when one of their own is effectively a hostage. Do you really want to be responsible for that?"

Wickham waited as the seconds ticked by. His mouth felt dry, and beads of perspiration tickled his forehead.

Finally, Ambassador Prazon reached for his pendant and placed it once more around his neck. Zwaren signaled to Wickham, and he carefully handed her pendant back out of her father's line of sight.

"Captain Pamona," Prazon said.

"Yes?"

"Please open a connection between my quarters and the *Nestwood*. I must tell them to call off the attack."

Wickham could hear Pamona breathe a sigh of relief. "Right away, Ambassador. But I hope you will understand if I request that you leave your pendant on this time."

"Of course."

Pamona pushed a few buttons, and Shodron's face appeared in another panel on the screen. "Captain, are you ready to hand over the criminal?"

"Not quite, Commander Shodron. Ambassador, if you would?"

"Commander Shodron, this is Ambassador Prazon. On my authority as the highest representative of our government in the immediate vicinity, I order you to stand down your weapons. Do not fire upon the station."

The Stanquel commander started flailing his arms around. "But sir—your

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daughter—"

"Do not refer to the fugitive in that manner!"

A moment passed. "My apologies, Ambassador. We shall not attack the station until you tell us otherwise."

"Understood. Now please switch off."

The commander did so, and Prazon spoke to the captain. "Commander Shodron will not attack you. However, the *Nestwood* is remaining nearby to take the fugitive into custody once this unpleasant business is concluded appropriately."

"I understand," Pamona said.

"Well, I don't, Captain," Wickham said. "There's no guarantee that—"

Pamona cut him off. "Father Wickham, please be quiet."

Wickham bit his lip and listened as Pamona continued talking with the ambassador. "Ambassador, for our own safety, I'm afraid I have to confine you to quarters and limit your communications. I understand that the *Nestwood* has the right to remain near the station. However, we can't afford the risk of what Commander Shodron might do if you were to leave the station. I've already dispatched two soldiers to guard your door; you'll find them standing outside if you bother to look."

"This is preposterous!"

"It's for your own protection as much as ours." She paused. "Ambassador, we are waiting for an answer from the higher-ups in our own government. This matter will be resolved in the morning, I promise you."

"It had better be resolved to my satisfaction." He switched off his monitor, and his image disappeared.

Pamona looked at Wickham. "You won't turn her over, even now?"

He shook his head. "I am waiting to hear from the Commander of Chaplains."

"But what if the Commander rules against you?"

Wickham hesitated. He glanced over at Zwaren, who seemed to be just as concerned about the question. Finally, he replied, "May God be with you, Captain. Good night," and turned off the intercom.

Wickham woke with a metallic taste in his mouth, and a gritty feeling under his clothes. He wanted a tooth pill and a cleanser, but all his toiletries were still in his quarters. Had he remembered, he would have asked Sam to bring him a few personal effects. But, of course, he had had no time to think ever since Zwaren had come into his life—

My Lord, he thought. Has it really only been two days? He pulled himself up from the pew, shook his head vigorously, and called out into the darkness. "Zwaren, are you there?"

"I have nowhere else to go," the alien replied.

"Lights," Wickham called out, and illumination filled the chapel. Wickham saw Zwaren sitting just a few pews away, her arms wrapped around her tightly.

"Are you cold?" he asked.

"No. I am not cold."

"Nervous?"

Zwaren looked up at him. "Perhaps. A little."

Wickham nodded. "It's understandable, given everything that's going on. Let's see what we've got for breakfast."

Wickham started to walk towards the kitchen when the chapel's door intercom buzzed. He stopped short, walked over to the door, and pushed the button. "Yes?"

"Father Wickham, this is Captain Pamona. I need to come in."

Wickham glanced at Zwaren and said, "We will have to eat later." Into the intercom, he said, "Okay, Captain."

The door opened. Captain Pamona walked in, holding an electronic message pad. Private Sperry marched in right behind her, holding his pistol pointed down.

"Stay seated," Wickham whispered to

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Zwaren. "Let me find out what's going on." He stepped forward, keeping Zwaren behind him.

"Captain Pamona. To what do we owe the honor of this visit?"

She looked grim. "I'm afraid I have bad news for you, Father. The Commander of Chaplains says that you can't keep the alien here in sanctuary. It violates the multi-denominational aspect of the chapel."

"She said that?"

"Yes, she did. Do you want me to give you her exact words?"

Wickham ignored her sarcastic tone. "Yes, please."

Pamona sighed, lifted her pad to her eyes, and began reading. "'By order of the Commander of Chaplains. The chapel on Grand Central Station is, by necessity, an all-denominational chapel. The isolation of the station combined with the many different religions of the human people requires an allocation of resources that necessitates full and unfettered access to the sacred spaces as defined by this office.'" She stopped. "Are you sure you want me to read the whole thing? You can see where this is going."

"Yes, I can," Wickham replied testily. "Read it anyway."

Pamona shrugged and continued reading from the document. "'By invoking the concept of sanctuary, Father Lester Wickham forces the chapel to take on the sole characteristics of a Catholic Church, for what could very well be an indeterminate amount of time. However, he does not have the authority to refuse any other religious group their right to use the chapel, nor does this office, under the regulations that ensure full faith and credence to all religions. Therefore, since the chapel cannot be considered a permanent structure of the Catholic Church in any sense, Father Lester Wickham cannot justify his use of the chapel to ensure sanctuary, which is strictly a Catholic concept.'" Again, Pamona stopped and looked at Wickham. "Is that enough?"

"I'm entitled to hear the whole ruling."

Pamona sighed. "Yes, you are. 'By the authority of this office, Father Lester Wickham is ordered to relinquish the chapel to the next religious leader who requires its use, and to deny the alien Zwaren any further right to sanctuary.'"

"I see."

Pamona gestured at Sperry, who moved slightly forward, and then she turned back to Wickham. "Are you ready to turn her over?"

Wickham weighed his options. Throughout this entire tribulation, he had looked to the Heavenly Father to guide him. He had done all that God could expect of him. His mind told him that the battle was over, that it was now time to turn Zwaren over and resume his regular duties as the priest of Grand Central Station.

But his instincts said something else. And he now knew to trust his instincts.

"No," he heard himself say.

"What?"

"No, I am not ready to turn her over." He thought once more about the time his service was disrupted on Pardo's Planet, how he had once failed a sentient being that had come to him for help. He would not let that happen again.

Pamona moved in closer and looked up into Wickham's eyes, her lips pushed together in a mixture of irritation and disappointment. "Father, you have no choice. The order clearly denies you the right to establish the chapel as solely a Catholic Church."

"No, Captain, it doesn't. If anything, it reinforces that aspect."

"I don't understand."

Wickham put his fingers together, and then cleared his throat, to give himself the time necessary to put his thoughts in order. "When Grand Central Station was first being built, it was established that humans of all religions would need a place to worship God, no matter how

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they did so. This chapel serves as a universal place to worship God. If you deny my right to offer sanctuary under the auspices of the Catholic Church, then who's to say that you couldn't deny the next religious group from using the space simply because of political differences? We have to give the Catholic right of sanctuary the same full faith and credence that we do to any other aspect of any other religion. Otherwise, you open up the floodgates to ban any religious practice, from the Christian Eucharist to the Jewish Kiddush, or any other sanctification in between."

Pamona sighed. "We're not denying any religious practice but sanctuary. The other clergy need this space back."

Wickham shook his head. "Rabbi Binyamin has already said he would stand by my decision."

"Oh? Have you spoken to the Imam? Or the Buddhist priests? Or the lamas?"

"No," Wickham admitted. "But Rabbi Binyamin is doing so on my behalf, even as we argue."

"Well, I'm not going to wait." She sighed. "Your argument smacks far too much of convenience. You were willing to accept the ruling of the CoC before, weren't you?"

"I had expected—I mean, I needed to know what she would say."

"You had expected her to rule on your behalf. Well, that didn't happen, and I was prepared for the possibility."

"You were? What were you planning to do if she ruled in my favor?"

Pamona hesitated. "The question is moot now, Father. She ruled against you. Now turn over the alien."

He shook his head. "No. I won't accept your authority on this matter. And it appears that I can't accept the authority of the Commander of Chaplains either."

Pamona glared at him. "So whose authority would you accept?"

To Wickham, the answer seemed obvious, but he knew that Captain Pamona was not a religious woman. So, in measured tones, he replied, "I would accept the authority of only one being: my Lord and Savior Jesus Christ."

She rolled her eyes. "I was afraid that you would say that."

"It was my only possible answer. I could only accept His authority."

"Well, he's not coming today." She sighed. "So for the last time, Father, please move aside."

Wickham stepped directly in front of the captain. "I'm sorry, Captain. Zwaren is under my protection. If you're going to arrest her, you're going to have to take me too."

"Very well, Father. Private?"

Private Sperry reached out with a pair of cuffs. Wickham extended his arms, placed his wrists together, and closed his eyes.

However, just as he felt the cold polymer of the cuffs beginning to wrap around him, Pamona said, "Wait."

"Captain?" Sperry asked.

"Father Wickham has agreed to come with us willingly. We don't need to put him in restraints."

Wickham opened his eyes and let the tension drain from his body. "Thank you," he said.

"You're welcome. Unfortunately, I can't extend the same courtesy to Zwaren." She turned back to Sperry. "Put her in restraints."

He turned towards Zwaren, who jumped behind Wickham and placed a hand upon his shoulder. "Father, what is going on? I thought you were protecting me."

"I am, Zwaren."

"But I just heard you agree to give me up."

"Not quite. I am giving both of us up."

She grabbed Wickham by both shoulders and wrenched his body around so he was facing her. "Are you revoking your sanctuary?"

Wickham gritted his teeth against the pain and forgave Zwaren in his heart. "No, Zwaren, I am not revoking anything. I will continue to fight for you.

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But I can't do it from here. We're going to have to go with Captain Pamona."

"No," Zwaren said softly.

"Don't worry, I'll be with you all the way. I've come too far to back off now."

Pamona cleared her throat. "Um, Father?"

"Yes?"

"Once we have Zwaren in custody, we have to turn her over to her own people. You're not going to be able to go along with her."

"But I must," he said. "As a Catholic priest, I owe her that."

Pamona shook her head. "I'm sorry, Father, but it can't be that way."

"Then," Zwaren said, "it shall not happen at all."

Before Wickham could stop her, Zwaren lunged for Private Sperry's weapon. She got her hands around it and began pulling. He leaned back and held on tightly, but it was no use. Within seconds, Zwaren had the pistol aimed straight at the private's chest. A sudden hush filled the room and the three humans held their breath.

"If you can't help me any more, Father, then I will have to help myself."

"No," Wickham said. He placed himself between Zwaren and Sperry, so that the pistol now pointed straight at his own heart.

"Father—" Pamona began.

"It's okay, Captain. Private, move away."

"Stop!" Zwaren shouted. "Father Wickham, I am warning you. Move aside, or I will shoot."

Wickham shook his head. "How dare you!"

"I tell you again to move aside," Zwaren said.

Instead, Wickham took a step towards the alien. "And I say again: how dare you? You come in here, claiming to respect the sanctity of life, but when the chapel no longer serves your needs, you defile that respect by pointing a gun at its spiritual leader."

"I—I'm warning you, Father—"

"No, Zwaren. It is I who must warn you. God will not look kindly upon your actions if you murder me. You came to the Church for help, and the Church responded with help. But if you approach the Church with anger, hate, and violence, although we may follow our Lord's dictum and turn the other cheek, what do you think the Lord will do?"

"My God understands."

"We serve the same God, Friend Zwaren. We just do so in different ways."

"Impossible. My God is helpful. Yours has abandoned me."

"If you threaten murder, then you have abandoned Him, not the other way around." Wickham moved closer. Cold sweat pooled on his neck. His hands felt clammy and his throat constricted.

He got within one final step of Zwaren and grabbed the pistol out of her hands before she had a chance to react. He tossed it as far away as he could, and they heard it clatter in the distance.

Zwaren looked at Wickham. For a moment everyone in the chapel froze. Then suddenly, Zwaren's arms wrapped around Wickham.

"I'm sorry, Father, I'm sorry," she kept repeating, her body wracked with alien sobs of sadness and regret.

Wickham hugged her back. "It's all right, child, it's all right."

By the next morning, Wickham, now freshly showered and shaved, was summoned to see the captain. The door to Captain Pamona's office closed as Wickham took a seat at the small round conference table. Directly to his right sat Pamona herself; to his left sat Earth Ambassador Andrew Kroll.

And directly across from him sat Ambassador Prazon of the Stanquel, the father of Zwaren.

"Well, Father," Pamona began, "you will be pleased to hear that we convinced Ambassador Prazon not to press any charges."

Wickham raised his eyebrows. "Press

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charges? For what?"

"Aiding and abetting a known criminal," Kroll answered.

Wickham glanced at Prazon, and then decided to focus his arguments at Kroll. "With all due respect, sir, that's completely untrue. First of all, I had no idea that Zwaren was considered a criminal when she asked for my help—"

"Ignorance of the law is no excuse," Kroll interjected.

"—and secondly, the Treaty specifically states that the Free Cultures must give full faith and credence to the religious beliefs of the member races. Even those who are minor members of the Alliance."

"But that's just it, Father. You weren't giving 'full faith and credence' to the Stanquel religion."

"I wasn't?"

Prazon suddenly spoke up. "Your system is unwieldy."

"Pardon me?" Wickham asked. "What system?"

"So many religions," the alien ambassador spat out with distaste.

"That is who we are," Kroll said gently. "We are a diverse people. We don't force everyone to conform to the same views."

The alien turned its lips downward, in what appeared to be a sneer. "Your insistence on diversity makes you weak."

Wickham cleared his throat. "On the contrary," he said, "I like to think that our diversity makes us strong."

The alien ambassador looked at Wickham and chittered. "Strong? Your own people went up against you to return my daughter to us. My understanding is that this little incident has caused fractures and ripples all through your society, up to the highest levels. How does that make you strong?"

"Because diversity allows us to weigh many different opinions, to convince each other of the rightness of our positions. To get closer to the truth."

"And what is truth?" the alien asked.

The question echoed through Wickham's mind. He hesitated, then said, "The truth is what I have faith in. It is what I believe." He paused again, then said quietly, "The truth shall make you free."

The alien made the clicking sound of Stanquel laughter. "What is the name of your religion? Christianity? If it is so correct—if it is, as you seem to believe, the truth—then why did you not convince everyone else to follow you?"

"We must all come to the truth in our own way."

"Rubbish," the alien replied. "If you are so sure of your truth, you must fight for it."

"Brute force is not the answer."

"Do not insult my beliefs. The Stanquel believe that God is always on the side of the victor, and in such conflict is God's truth revealed. It has been our way, since the time of Barden, who showed us that strength is the only valid path to truth."

"God favors the side with the superior firepower," Wickham muttered under his breath.

"What was that?"

He spoke up. "An old saying among our people claims that 'Might makes right.'"

"Indeed."

"If my people were as inflexible as yours, we would have destroyed our society long ago. If you remain as inflexible as you are now, Ambassador Prazon, your people—"

"My people will what?" he interrupted.

An awkward silence filled the room for a few seconds. Finally, Captain Pamona broke it. "Gentlefolk, we're getting too far away from the point here."

"Indeed," Prazon said. "So let me get to the point. My government has agreed to allow the followers of Abapater to colonize their own planet. We are giving them a place to live."

Surprised, Wickham said, "That's very generous of you."

"However," Prazon continued, as if Wickham had not spoken, "there are

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conditions. First, the heretics are to have no contact with any other Stanquel but themselves. To us, it is as if they no longer exist."

"Excommunication," Wickham said.

Prazon glared at him. "By their own choice, not by ours."

Wickham started to argue the point, then changed his mind. "You said there were other conditions?"

"Indeed. The second condition is that you must agree to be responsible for their actions."

"I don't understand," Pamona said.

"It means that if Abapater's people are no longer part of the Stanquel Set, they must be granted Earth citizenship. Then we shall know who to blame for their infractions."

Ambassador Kroll cleared his throat. "We can't grant them Earth citizenship, but we could certainly make their planet an Earth protectorate. But in no way can that mean that Earth's government is responsible for their actions."

"If they break Earth law, or AFC law, you would do nothing?"

Kroll shook his head. "On the contrary, if they are an Earth protectorate, we would expect them to abide by Earth laws. Which means that if they ever break Earth law, we would, of course, punish them."

Prazon took a deep breath of air. "And, of course, by extension, should any of the heretics ever do anything that disrupts Stanquel society, we would hope that the Earth government would take a leading role in punishing them as well. Otherwise, there might very well be uncomfortable consequences for both our races." He paused. "Do I make myself clear?"

"Crystal clear," Kroll replied, and he shot Wickham an angry look. Wickham could easily figure out his thoughts. If the Stanquel ever went to war against Earth, Kroll would hold Wickham personally responsible.

Wickham looked down at the table and said nothing.

"Then," Prazon said, "if we are all done—"

"Just a moment," Wickham interrupted. "What happens to Zwaren?"

Prazon looked directly at Wickham. "It displeases me that my own daughter was a party to this. As a consequence, although she may side with the other followers of Abapater, I do not wish to see my daughter nor the eggs of my egg raised as heretics. Therefore, Zwaren may not join with those followers of Abapater whom we have excommunicated, but must live among true believers as an example of the evils of heresy."

"What about her children?" Wickham asked.

"She has agreed not to bring either of her children to term, and to undergo surgery which will prevent her from ever becoming pregnant again."

Wickham shot out of his chair. "You can't be serious!"

Ambassador Kroll grabbed his arm. "Father, sit down."

"This is unfair, this is unjust! Zwaren's unborn children have every right to be brought to term."

"Father—" Kroll began.

"I'm going to talk to Zwaren." He looked at Prazon. "You can't allow this to happen. Zwaren told me that Barden spoke against sterilization."

Prazon looked smug. "That is only for true followers, not for heretics," he answered. "And you may as well resume your seat, Father, as the procedure has already been done."

The words echoed through Father Wickham's mind. *Already been done . . .*

Wickham shook his head. "I can't believe you would treat your own daughter that way, Ambassador."

Prazon remained silent and stoic. Finally, Ambassador Kroll turned to Wickham. "Father, the rest of us have much more we must discuss, but you may go."

Wickham realized that he was being dismissed. He pushed himself out of the chair, walked to the door, and hesitated.

"Ambassador Prazon?"

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The ambassador looked at him with disdain. "Yes?"

"Just keep in mind one thing. One day, Abapater and his followers may become the stronger ones. On that day, it is you who will have to change his mind as to what is truth."

Prazon made a snorting sound. "That will never happen."

"We shall see," Wickham replied, and the door closed behind him.

Thursday morning, thought Father Wickham, as he looked out the chapel windows at the cold dark of space. How long had it been since he saw a sunrise? He strained to remember.

The chapel doors clanged open and in walked Zwaren. She approached Wickham slowly with her arms outstretched, presumably to show that she carried no weapons.

She also looked decidedly slimmer. Apparently Stanquel women carried their children in the abdomen, just like human women.

"Have you heard?" she asked.

Wickham nodded. "I'm sorry."

"Don't be sorry, Father. It was necessary."

"You really feel that way? I wouldn't have expected it given how fiercely you fought for your children before."

"I did not fight for my children, Father. I fought for my cause."

Wickham felt cold. "That's a dangerous attitude, Friend Zwaren. Years ago, in the past, some in our culture who were opposed to abortion resorted to murder. Some of those, I regret to say, were Catholics. They were people who thought they knew better than their church leaders how to respond to a situation that moved them with a deep passion. But they allowed themselves to fall under the sway of fanaticism. They fell so deep that they would break the fifth commandment in order to preserve it."

She looked at him silently for a moment, then said, "They committed murder to prevent murder?"

Wickham nodded. "Exactly."

"That is illogical. If you are against murder, you should be against murder in all its forms. If you commit murder to prevent murder, then you are as bad as the criminal or sinner you condemn."

"My point exactly."

"But I did not commit murder, Father Wickham. I never would have done so. I am as opposed to it as you are."

"This isn't about murder, Zwaren. This was about fanaticism."

"I don't understand."

Wickham sighed. "I was merely making a comparison. People sometimes become so wedded to their causes that they can't see the forest for the trees."

"Pardon?"

"It's a human expression. It means that sometimes people get so lost in the picayune details of their causes, that those details become more important to them than what they are really fighting for."

He moved in close, put his hands on her shoulders, and looked her straight in the eyes. "Don't let yourself get lost in your cause, Zwaren. Your own needs are important as well."

"My father's needs were paramount. Mine were irrelevant."

Wickham stared at Zwaren for a few more seconds, then let go of her shoulders and turned away. "So what will you do now?"

"For a brief time, I shall return to my father's house."

"What? I thought he wanted nothing to do with you."

Zwaren clicked with laughter. "He has decided that it might be worth his time to attempt to educate me properly in the ways of our people. So I am giving him the opportunity to do so." She paused. "I expect that he will abandon the attempt before too long."

Wickham couldn't help but smile at that. "And then where will you go?"

"I will join my people, of course. The heretics."

"I thought that by the agreement

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reached, you're prohibited from joining the excommunicated Stanquel on their new planet."

"That is correct."

"So—I don't understand."

"There are still pockets of Abapater's followers on other Stanquel planets. I may not be as cut off from my people as you might think."

Wickham nodded. "God be with you, Friend Zwaren."

"And with you, Father Wickham. I will never forget the kindness that you did for me."

Zwaren left the chapel, and a moment later, Wickham followed suit. He walked back to his quarters, whistling a Gilbert & Sullivan tune. He was now filled with a sense of the awesome responsibility of his role in the Universe, and the knowledge of God's presence in all things. Perhaps Archbishop Peter Grace and the Catholic Church had sent him here because they thought that the posting was the most minor one in the galaxy, but Wickham now realized that, with the help of divine providence, he could make his position as the station priest into one of the most influential within the Alliance.

He got back to his room and tried to decide which he wanted to do first: take a shower or take a nap. Within a moment, he had come to his decision. He sat down at his desk, pulled out his electronic pad, and began composing his next sermon. ■

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Science Fact

Water World, Glacier World, Dust World

Kevin Walsh

What can live on a planet depends very much on climate, and that, in turn, depends very much on astronomy.

Planets around other star systems—we now know that there are many of them, and more are being found every year. Those discovered so far are mostly large gas giants, as these are the easiest to detect. Nevertheless, for every gas giant discovered, there are probably many smaller worlds yet to be found, including planets roughly the size of Earth. These are the so-called terrestrial planets.

This is not big news to readers of speculative fiction. What is not known is how many terrestrial planets there are in the Galaxy and what they are like. Important variables that determine the characteristics of a terrestrial planet are the amount of water retained during its formation, its mass, and its temperature. All of these together help determine the climate of the planet, which in turn largely determines its habitability and potential to support life. Abundant water appears to be particularly important for carbon-based organisms, and searches for life in our solar system are concentrating on regions where liquid water is known to exist now or where it has likely existed in the past: for instance, dry lake or river beds on Mars, or beneath the frozen surface of Europa. Since there are several locations in our solar system where life is at least possible, it seems likely that there are many more such places on planets orbiting nearby stars.

We will probably know much more about these extrasolar terrestrial planets in a few decades, since there are several proposed observational programs designed to find them, measure their temperatures, and determine their atmos-

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pheric compositions. One such program is NASA's Terrestrial Planet Finder, an ambitious mission that will use a number of imaging techniques to measure the size and position of extrasolar terrestrial planets. Spectroscopy will also be employed to determine whether the planets' atmospheres contain signs of possible life, such as water vapor, ozone, and methane.

The Terrestrial Planet Finder will be launched in 10 to 15 years. In the meantime, simulations of planetary formation using computers are giving us insights into the types of worlds that might be encountered. These simulations are also helping to define the conditions under which planets might form, which will be useful in deciding search priorities for future orbiting observatories like the Terrestrial Planet Finder.

Simulations of planetary formation have been around for a while: George Wetherill from the Carnegie Institution of Washington has been running them since the 1980s. The simulations start with a number of randomly-positioned lunar-to-Mars-sized planetary "embryos" which then move around the solar system, collide with each other and agglomerate into larger bodies, or are ejected from the system by gravitational interactions with giant planets. As computers have become more powerful, more realistic simulations have been achieved. Work by John Chambers at NASA has produced MERCURY, a new, three-dimensional simulation package for terrestrial planetary formation. Starting with about 150 embryos, terrestrial planets are produced after a simulation time of about 50 million years.

Physical scientists who set up and analyze computer simulations like to refer to their runs as "experiments." A recent experiment using MERCURY has been performed by Sean Raymond of the University of Washington and his collaborators, focusing on the means by which water is delivered to terrestrial planets during their formation. Several parameters were varied in these experiments, including the size, position and time of formation of "Jupiter," or actually a gas giant that might be located in another solar system in a position analogous to that of Jupiter in our own system. It is likely that Jupiter played a big role in the formation of the terrestrial planets in our solar system, by gravitationally altering the paths of planetary embryos. The density of solids in the initial planetary nebula was also varied, as well as the location of the "snow line," or the distance from the primary where permanent ice can form in space when exposed to the full heat of the primary. The embryos beyond the snow line, when they are perturbed inwards, serve as sources of water for the young terrestrial planets. The simulations were run for the computer equivalent of 200 million years. Interestingly, they were run on a 700-MHz PC, with each run taking from one to four months of CPU time, so they could be performed using the machine that I am using to write this article.

Many different terrestrial planets were produced. The main conclusions of the paper were that the orbital eccentricity of "Jupiter" plays a big part in determining whether the terrestrial planets formed have much water or not. If the gas giant has an orbit that is even moderately eccentric (i.e., oval-shaped), this drastically reduces the water content of the terrestrial planets formed. The eccentric orbit of the gas giant enables it to eject icy, water-bearing embryos from the system or forces them to collide with the Sun instead of coalescing to form planets. Since most of the extrasolar gas giants so far discovered have eccentric orbits, this means that they may also have created dry terrestrial planets, although many of their orbits are so close to their primaries that they would likely not permit terrestrial planets to exist at all. Other experiments showed that if "Jupiter" is more distant from the primary, large terrestrial planets with high

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Planet	Distance from primary (AU)	Eccentricity of orbit	Mass (in Earth masses)	Water content (in number of Earth oceans)	Water mass fraction
Earth	1.00	0.03	1.0	1-10	0.001
Mars	1.52	0.09	0.11	<1	<0.001
1	1.09	0.11	2.02	53	0.007
2	0.98	0.15	0.86	0	$1x10^{-5}$
3	1.24	0.10	2.03	35	0.004
4	1.15	0.08	1.28	36	0.007
5	1.40	0.25	0.96	91	0.024
10a	1.09	0.11	0.38	5	0.004
10b	1.38	0.06	1.08	3	0.0009
11	1.20	0.13	1.09	16	0.004
12a	0.83	0.11	0.74	14	0.005
12b	1.35	0.10	0.70	9	0.004
13	1.00	0.02	1.27	13	0.003
25	1.05	0.07	3.11	292	0.024

Characteristics of planets produced by simulation, compared to Earth and Mars. The large range of water content for the Earth is due to a lack of knowledge of the precise amount of water hidden in the interior of the Earth.
From Raymond et al. (2004)

water contents can form.

This is useful information, but what is really interesting is the wide range of terrestrial planets produced. The table above summarizes a sample of the planets formed, and they are a motley bunch. Only those planets that orbit between 0.8 AU and 1.5 AU from the primary are included here (Earth's orbit is on average 1.0 AU from the Sun). Let's have a look at how these physical characteristics might affect their climates and thus their overall habitability.

Planet 1 is slightly farther from the primary than Earth, but it is a heavy world with a surface gravity of about 1.4 gees—hard on the feet for all but the fittest athlete. Also, there is an abundance of water, to say the least: it is a water world, probably with its surface entirely covered by a single ocean. For comparison, to cover all land surfaces on the Earth, including the tip of Mt. Everest, the Earth's oceans would need to have about four times as much water as they do now. So Planet 1, with 5-50 times as much water as Earth, is likely to be completely oceanic. This implies an equable climate with few geographical variations; but on the other hand, it is difficult to envisage human beings living permanently on a purely oceanic planet.

Planet 2 is very good real estate by galactic standards: it's the right size and the right distance from the primary. Thus it might be large enough to have a thick atmosphere, perhaps dense enough for astronauts to dispense with space suits and use only modified scuba gear to stand safely on its surface. This also means that the atmosphere would provide useful protection against meteorites, solar flares and cosmic rays. One problem, though: not much water, only about one-hundredth as much as on Earth. Like Mars, Planet 2 might have water in subterranean aquifers and small ice caps, but little elsewhere. This has lots of implications for climate. Without significant amounts of water, there

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would be no oceans, so there would be big seasonal temperature variations unless the tilt of the planet's axis was small. Think of Siberia, but with no snow, much hotter summers, and colder winters.

There would be constant dust storms on this warm, desert world. Worse still, little water means that there would be not much weathering by rainfall and therefore not much absorption of carbon dioxide from the atmosphere. The absorption mechanism works like this: Billions of years ago, Earth's atmosphere had much more carbon dioxide than it does now, but since then, carbon dioxide has dissolved in rainwater and reacted with surface rocks, forming carbonates. Over millions of years, the carbonates have been pushed down into lower layers of rock, thereby removing carbon dioxide from the atmosphere. Without rainfall, this process would not operate effectively on Planet 2. So the planet would retain a great deal of carbon dioxide in its atmosphere, heating it up in a kind of super-greenhouse effect. This might be fine for a while, but since the primary would inevitably become brighter with age—just as the Sun has—the planet would continue to warm up with it. This is a planet living on borrowed time. Chances of a "runaway" greenhouse seem high; if the temperature of the surface approached boiling point, the water in its oceans would evaporate into the atmosphere. Since water vapor itself is a very effective greenhouse gas, temperatures would rise even more, leading to further boiling, and so on until the planet turned into a baking wasteland like Venus, which is not nice real estate at all.

Like Planet 1, Planet 3 is a large world and so distant from its primary that it is likely to be completely frozen over unless there is a substantial amount of carbon dioxide or other greenhouse gas in its atmosphere. For comparison, the naturally occurring greenhouse gases in Earth's atmosphere—mainly water vapor and carbon dioxide—ensure that Earth is about 33C (59 degrees Fahrenheit) warmer than it would be without them. Planet 3 would be a strange world: the very large amount of water suggests that the ice would be thick enough to cover almost all mountains in a featureless blanket—nothing but the wind, the sun and the ice.

Planet 4 is another iceball. Planet 5 is the same, but rather colder—so cold that -40 degrees might be a balmy day at the equator most times of the year. But this planet has an eccentric, oval-shaped orbit: it would receive considerably more solar radiation at closest approach to its primary than when farthest from it. Earth also has a slightly eccentric orbit, but it is not elliptical enough to affect the seasons noticeably. Closest approach to the primary for Planet 5 would be 1.05 AU, almost as close as Earth, while at its furthest it would travel all the way out to 1.75 AU, beyond the orbit of Mars. This is enough to have a very noticeable effect on the planet's seasonal cycle of temperature. Even the equatorial regions would experience summer and winter, unlike on Earth, where seasonal temperature variations at the equator are not large. So the equatorial regions of Planet 5 would have short, bright summers when the ice melts furiously for a few months, followed by long, slow, bitter winters that even Martians would find chilly.

Planet 10a is different. It has a water amount similar to Earth's, but it is fairly small, with surface gravity about 0.65 gees. A small world with such a significant water amount is bound to have big oceans at that distance from the primary, although maybe the oceans would not be not deep enough to cover all land surfaces. But Planet 10a is cold: it is farther from the primary than Earth and it is smaller, thus probably giving a thinner atmosphere and thus a smaller natural greenhouse effect. A smaller greenhouse effect on Planet 10a would mean lots of glaciers, maybe even close to the equa-

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tor. This is a glacier world: if it is not completely frozen over, it may be suffering from periodic Ice Ages, just like the Earth is at present, but on a larger scale. Life would have a hard time on Planet 10a.

Planet 10b is another glacier world, but drier and much colder. How much colder? A little hard to say, but without a large greenhouse effect, maybe cold enough to completely freeze the oceans. Planet 11 is probably another glacier world. Planet 12a is interesting: it is a warm world, closer to the primary than Earth is, slightly smaller than Earth, but with lots of water. It might be an island world or maybe even a completely oceanic water world. But it would be hot: a steamy, humid planet, unbearably so in the tropical regions, but with cooler areas near the poles where conditions might be hospitable. Whether they would remain that way for a long time is open to question: the planet is closer to the primary than Earth, and a runaway greenhouse might be problem later in its evolution. Planet 12b is another glacier world and a very cold one: unless the planet had a very thick greenhouse atmosphere, it would be unlikely to experience average temperatures above freezing even at the equator.

Despite the unlucky number, Planet 13 has the best prospects of any on this list. It is a largish world with lots of water, but is not a water world—this is a world with islands or small continents. Big oceans combined with warm temperatures tend to imply a stable climate. This is important because planets can experience huge climatic shifts without any change at all in the total amount of radiation arriving from the primary—just look at what has happened to the climate of Earth in the past few hundred thousand years with the ebb and flow of the Ice Ages, a largely internal climate instability that has arisen due to a number of factors including continental drift and the presence of substantial amounts of ice on the northern continents.

Some truly bizarre planets were produced as well. Take Planet 25—one could call it a water world, but that really doesn't do it justice. With a mass more than three times that of Earth and ocean depths around 100 km, it seems like a world of a different class from Earth. Its atmosphere would probably be correspondingly massive, so it would be warm even though it is slightly farther from the primary than Earth. Due to the dense atmosphere, there would be little temperature contrast between the poles and the equator, and the planet would be swathed in thick bands of cloud: it could be termed a water sub-giant. Several of these sub-giants were produced in these simulations.

The experiments by Raymond and his team created more worlds, but you get the idea. The future of this simulation technique seems bright: new simulations are planned using many more planetary embryos. This would make the simulations more realistic, as real planetary formation involves the collision of billions of particles rather than a couple of hundred. Another limitation of this approach is that in simulations of this kind, numerous approximations need to be made that further limit the accuracy of the technique. Thus it is unlikely that simulations like these can encompass the full range and distribution of possible terrestrial planet types. But the technique does have the potential to advance our understanding of planetary formation and to give us an idea of the kind of terrestrial planets that we are likely to find once we are able to start looking.

Nevertheless, of the 44 simulations that were run, only a few produced worlds that might have climates genuinely hospitable for human beings. I won't address the argument of whether life exists abundantly in the galaxy or not, as we currently have little data on this topic. On Earth, though, life can exist in many environments, but not all of these are pleasant for humans. The

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point that I am making is that, based on climate alone, *potentially life-bearing* worlds are likely to be common in the Galaxy, but truly *Earth-like* worlds, ones that have climates genuinely hospitable to human beings, are likely to be rare. These simulations show this quite clearly, even given that there is a margin of error caused by unrealistic aspects of the experiments.

Of course, when I say "Earth-like," what I really mean to say "Earth-like as it is now, in the twenty-first century." This is because Earth's climate itself has varied considerably over geologic time. In its youth, several billion years ago, Earth was warm and wet, with little or no evidence in the geologic record of permanent ice. This was due to large concentrations of greenhouse gases in its atmosphere at the time. Despite the Sun being considerably dimmer then than it is now, the greenhouse effect was large enough to keep the planet warm. Gradually, though, carbon dioxide absorption by rocks and by early life forms reduced the carbon dioxide concentration in the atmosphere. Eventually, by about 600 million years ago, the Earth had cooled to the point where glaciers formed and were likely present at low latitudes. Whether the Earth ever became an iceball or not is controversial, but certainly glaciation was widespread at that time. By the age of the dinosaurs, the Earth was warm again, with no permanent ice, a "continent world." During the Quaternary period, in the past few million years, large permanent ice caps have again been a feature of the landscape, so Earth is once more a glacier world. The planet has not experienced only one climate throughout its history, but the presence of large oceans has moderated the climate swings that could be experienced.

For extrasolar terrestrial planets, there are many climate spoilers that can make them less habitable. For instance, there is mounting evidence that a planet like Earth needs a close, large satellite like the Moon to stop its axis from oscillating wildly every few million years. Currently, the tilt of Earth's axis averages about 23.1 degrees to the plane of its orbit and oscillates only a couple of degrees, over a period of 42,000 years (right now, the tilt is at 23.45 degrees). If the Moon weren't there, some calculations have suggested that the orientation of the axis could oscillate by as much as several tens of degrees, with disastrous consequences for planetary climates because a large axial tilt would mean very large seasonal temperature variations in the mid and high latitudes. Imagine the Arctic Circle if it were moved down to the southern United States, with the Sun above the horizon for the entire summer, night included, resulting in maximum daytime temperatures that don't bear thinking about. Evidence also suggests that the axial tilt and rotation rate of a planet can be drastically altered by large collisions late in the formation process. Consider what summer on Earth would be like with days lasting 100 hours instead of 24.

Atmospheric composition is very important for climate and habitability. Too large an amount of greenhouse gases and the planet will not only be very warm, it could be poised for a runaway greenhouse. Too small and the planet might turn into an iceball and never warm up again. This can happen even if a planet is initially hospitable to life, experiencing moderate temperatures and extensive oceans early in its history.

It gets worse. Simulations have shown that, in our solar system, Jupiter is doing Earth a great service: it is protecting our planet from comets and asteroids by throwing them out of the solar system with its gravity. Take away Jupiter and perhaps 100 times the present rate of cometary impact would occur on Earth. What would life be like on Earth if a comet the size of the one that killed the dinosaurs came along not every 100 million years or so, but every million years—and if a large, threatening im-

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pact, big enough to take out a city, happened not every 1,000 years or so as it does now, but every 10 years?

Terrestrial planets—warm ones, cold ones, water worlds, iceballs, glacier worlds and desert worlds—are likely abundant in the Galaxy, but few of them will be really like the Earth. Having said this, we won't know for sure until we look.

Further reading:

Chambers, J.E., 2001: "Making More Terrestrial Planets." *Icarus*, Vol. 152, pp. 205-224.

Raymond, S.N., T. Quinn and J.I. Lunine, 2004: "Making Other Earths: Dynamical Simulations of Terrestrial Planet Formation and Water Delivery." *Icarus*, Vol. 168, pp 1-17. ■

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Take Me To Your Liederkranz

Lawrence M. Schoen

What's in a name?

Tuesday afternoon and Jacob was going about his job, doing all he could to save the world. Again. His black suit contrasted sharply with the bright white walls of the hospital as he stalked down the corridor seeking the secondary trauma ward in the north wing. He quietly entered the near-empty room and walked toward the occupied bed. "Gouda," said the teenage girl sitting there. Jacob studied her. Curls of bright red hair peeked out from the edge of the bandages around her head. Her left arm was in a cast. She wore a beige hospital gown with a random pattern of blue speckles. A woman stood next to the bed, holding a book, talking to the girl. She looked Chinese, middle-aged, and wore a white lab coat. Jacob consulted his notes.

"Dr. Wu?" he said. "My name is Jacob Saltzman. I'm with the State Department. I take it this is your patient, Elizabeth Saunders?"

The woman looked up at him, somewhat startled. That happened a lot; Jacob had a habit of moving very quietly.

"There's really no need for you to have come out all this way," said Dr. Wu. "As I explained in my email, Ms. Saunders's condition, while unusual, certainly doesn't merit an investigation."

Jacob glanced around the room, cataloging its contents. Several plastic crates lay scattered randomly about, filled with everything from staplers to mittens to wooden chess pieces. A low table contained the remnants of lunch: a pizza delivery box, a two-liter bottle of cola, plastic cups, and paper napkins. He turned back to the room's other contents, the girl and her doctor. "On the contrary, and not to state the case too strongly, but I believe her condition is critical to the future well-being of every person living on the planet. Now, why don't you bring me up to speed on what you're doing? What's that book in your hands?"

"Gouda," said the girl in the bed, and then with a nod toward Jacob, she added, "Gjetost" and smiled.

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"It's a reference work, Mr. Saltzman. Though to my patient it's the word 'Gouda.'"

"In your email you indicated she was doing fish."

"That was yesterday," said the doctor. "She started in on cheeses this morning."

Jacob nodded. He was beginning to get a glimmer of an idea. He stepped closer to the bed. "Hello, my name is Jacob Saltzman. I'm from the State Department. Can you understand me, Elizabeth?"

She nodded to Jacob and called out to him. "Gjetost! Gjetost!"

"Understanding you isn't the problem," said Dr. Wu. "You can see the video tapes if you like. One minute she's labeling everything as fish, and the next she's wheying in with cheeses." She fluttered her fingers, and added, "Sorry, I've been hearing nothing but cheeses all day, and if I didn't resort to a bit of word play, I'd have gone loopy by now."

"You're sure it's labeling? Not just some kind of domain-specific babbling?"

"Oh, yeah. It's not random semantic gibberish. She's excruciatingly consistent. I had her up in the MRI room two days ago when she switched from minerals to fish. She'd been calling me 'Serpentine' for several days and just pointed at me and named me 'Trout.' They took her back down here, and by the time I came in, she'd already renamed my entire staff and half the objects in the room. My best guess is that however she's doing this, there's some kind of rule system at work that makes me look like whatever it is she thinks 'Trout' means."

"And only nouns? Only things? No verbs of cheesing?"

The doctor shook her head. "Not a one. No other parts of speech at all, just nouns."

Jacob hmmmed. Another piece of the puzzle.

"Montassio," said the red-haired girl, clapping her hands. Jacob turned back to her. "Montassio, Ricotta." She pointed to herself and then the bed. "Mozzarella." A finger aimed at Dr. Wu. She pointed at Jacob with both hands, index fingers extended and thumbs raised, like a pair of imaginary guns. "Gjetost. Gjetost."

"What the hell is 'Montassio?'"

Dr. Wu waved the book she'd been holding, the 'Gouda,' and tossed it to him. *Dorrance's Guide to Cheeses of the World.*

"Montassio's a hard cheese, pretty sharp. It's become her name. Far as I can tell, it's all arbitrary assignment. There's no more reason to call her 'Montassio' than there was for her to be named 'Bass' before that, or 'Feldspar' before that, or 'Brittany Spaniel' or any of the other domains she's drawn from.

"'Brittany Spaniel'?"

"When she first came out of her coma, the only words she could speak were different breeds of dogs. She'd been struck in the head by some debris from that Chilean weather satellite that dropped out of the sky last week. She was only in a coma a few days, and she's been like this ever since. It's odd that the brain damage would be so isolated. Other than her language problem, she's completely recovered."

"That's why I'm here, Doctor. But it wasn't a weather satellite. We believe she encountered an alien probe attempting to make contact. I've been in every hospital within two hundred miles, meeting every babbling mental patient admitted in the past week, searching for the point of contact."

"Alien probe? But that doesn't make any sense."

"First contact attempts rarely do. Language barriers are never easily overcome, which is why we look for anomalies, like Ms. Saunders here. Now, can you tell me why she keeps switching semantic domains?"

"Oh, I've learned how to force that," said Dr. Wu. She gestured at the crates around the room. "It takes a while, but

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by presenting her with a series of concrete objects for her to name, she eventually runs out of words. When she does, she jumps to a new taxonomy, with no apparent recollection of any of the previous ones. In fact, it's like the old terms are locked out of her awareness, and she *only* has the words in the new semantic domain."

Jacob frowned. He reached into his pocket and pulled out his handkerchief and held it in front of the girl. She smiled, head bobbing. "Derby!" she said, and then again, "Derby!"

"I see what you mean," said Jacob. "So, that's now her word for handkerchief."

"'Derby' doesn't necessarily mean 'handkerchief,' Mr. Saltzman. It could just as easily mean 'square' or 'cloth thing.' You'd need to present contrasting objects to find out for certain."

Jacob nodded. "And yesterday it might have been 'Salmon' or 'Cod,' is that it? I think I see where this is going."

"If you've detected a pattern in this, I'd appreciate your sharing it, Mr. Saltzman."

"Alien probes are usually intended to establish communication, but this time something went awry. She's clearly stuck in a kind of taxonomic loop. The trick is to break it."

"What do you mean, 'usually?' And how do you propose to go about breaking this loop of yours?"

Jacob ignored the first question. Instead, he started toward the remains of lunch and opened the pizza box. He pulled a slice free and systematically picked off the slivers of pepperoni and anchovy until there was only cheese. Then he carefully lifted the cheese free of the crust, flipped the glob of it over and wiped the sauce from the underside with a paper napkin.

"By creating a semantic conflict," he said at last. He carried it back over to Elizabeth Saunders and held it out for her inspection.

"She already has a word for 'pizza,' Mr. Saltzman. It's 'Feta.'"

"Ah, but this isn't pizza—not anymore. This is just cheese. More importantly, it's a specific kind of cheese—mozzarella. Except she's already assigned that word. So what will she call this? Hmmm?" Jacob thrust the cheese at her again.

The girl clutched at her head. "Feta," she said, with barely a whisper, and then a bit louder, "Mozzarella." Again and again she repeated both words, increasing in volume and rocking from side to side, gripping the sides of the hospital bed, until she was shouting. "Feta. Mozzarella. Feta. Mozzarella. Big cheese! Big cheese!" She slumped forward, unconscious.

"I don't understand," said Dr. Wu. "What just happened? What did she mean by 'big cheese?' She's never used any adjective before, nor the name of the category she's drawing from."

"No, but it's what she's been trying to say. That was the pattern. Each of the domains she selected feeds into an idiom she needed to express. Big cheese, top dog, king fish."

The girl groaned faintly and began to sit up. "'Montassio', are you all right?" asked Dr. Wu.

The red-haired teen rubbed her head and blinked. "This vessel's proper designation is Elizabeth Saunders," she said. "My true name cannot map onto your speech, but I am an envoy conveyed here by our probe."

Dr. Wu stared, speechless. Jacob nodded and tossed the glop of cheese unto the table. "As I suspected," he said. "Your ship was detected a month ago. We've been hoping you would contact us."

The envoy inhabiting Elizabeth Saunders nodded, the movement fluid and natural. "Swift contact was our goal as well. I apologize for the prolonged possession of this individual. As you surmised, our probe malfunctioned. Thank

Continued on p. 66

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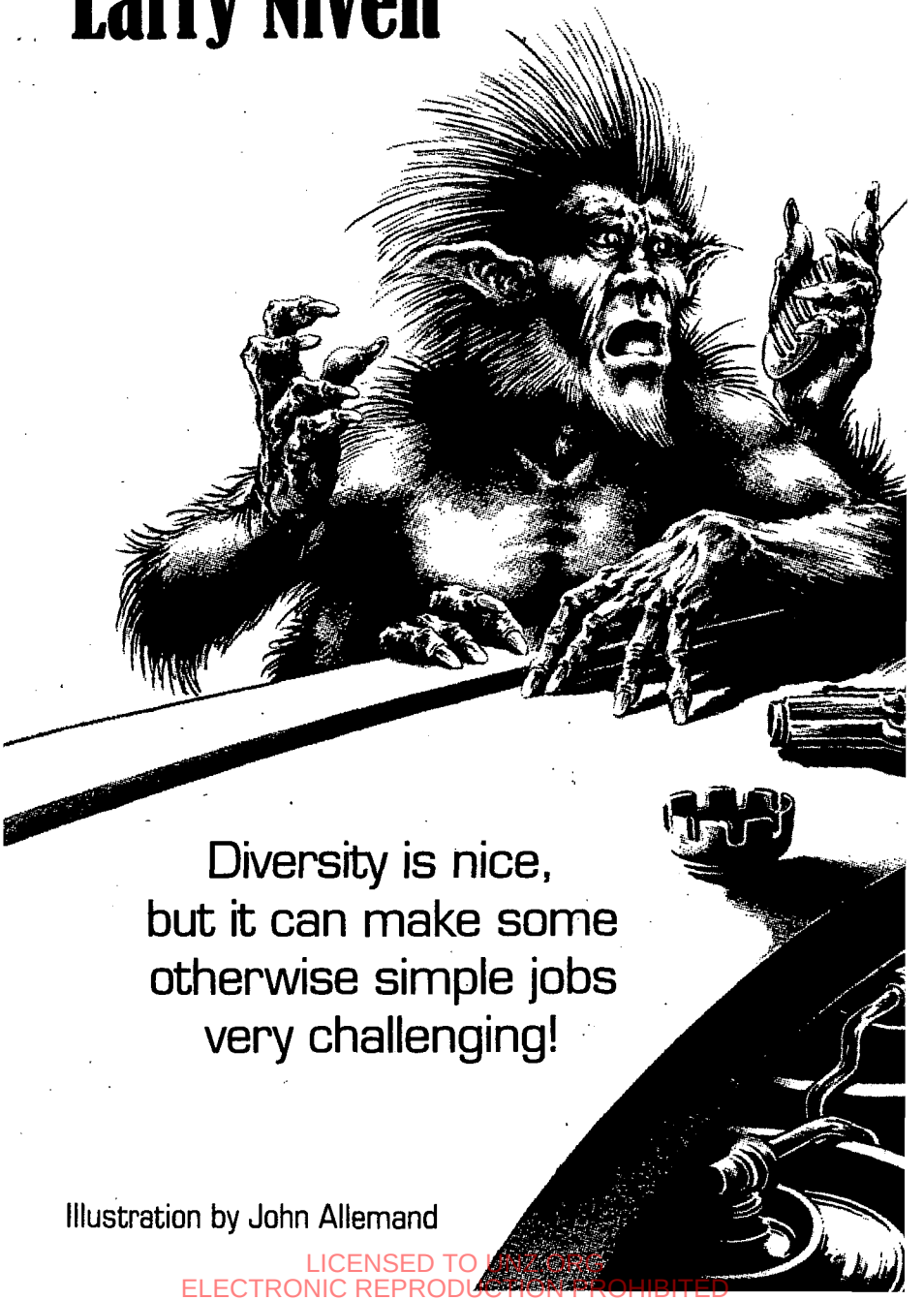
Breeding Maze

Larry Niven



Diversity is nice,
but it can make some
otherwise simple jobs
very challenging!

Illustration by John Allemand

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The Draco Tavern can be hot and cold, wet and dry, the air compressed or rarefied and of varying composition. Booth-sized temperature zones inside the dome must serve an eerie variety of alien visitors. But outside the tavern, the Mount Forel environment is thin and frozen, the vegetation sparse and hardy.

We use the cold in various ways. Storage for an unearthly variety of perishables is behind the tavern, along with a wide range of toilet facilities.

But we use the tavern's facilities, too. Housing for me and my staff is a wing of the tavern, and the climate control is the best on Earth. We don't get colds or allergies. Working the Draco Tavern isn't for everyone—it can freak you out, and some of my staff have stayed only hours—but it has its compensations.

One of last night's animals came in loose. I looked around for its owner and didn't see him.

As it stalked toward the bar from one of the small airlocks, I watched uneasily. Who might help with this? There hadn't been any Chirpsithra in the Draco Tavern last night, and there weren't any now. Rory was watching too, but he was across the room serving customers. The customers didn't seem disturbed, but it's not easy reading alien body language.

The beast would mass around a hundred and thirty pounds. It was hairy and musky. It walked as a biped: two short hind legs, four short, powerful looking arms, and a mouth not quite like any mammal's, but not insectoid. I'd looked for teeth last night, but seen none. I couldn't guess what it might eat.

It moved up against the bar, close enough that I could smell doggy breath, and suddenly reached over. I shied back. It snatched up a loose translator and snarled at it. The translator spoke.

I reached for my stun, and then the sense of the words reached me. "Was I stupid last night?"

I said, "Stupid? You were—" and stopped, feeling very foolish. "Yeah."

"Did anything bad happen?"

"Two of you came in with one of the spindly aliens, a Joker. He had you both on a leash, a tether. We don't allow pets in the Draco Tavern, but I wasn't quite ready to raise the point, because none of the crew were in." The crews of the interstellar liners are all Chirpsithra, and they're more or less in charge. "I thought it was their business, not mine, long as you stayed leashed. Also, I wondered which of you was the pet. In here you can't always tell."

"I comprehend."

"The Joker brought you up to the bar and started talking. Talking fast." It was starting to dawn on me that I'd been played for a fool. "And one of you voided something smelly against the bar."

"Sorry."

"The automatics got it. The Joker told me the two of you had been thawed by accident. Pets and children travel frozen, right? That's if the liners will have them at all. But you were pets and you'd been thawed, and you had to be kept exercised until . . . it sounded like legal problems."

"Jokers are well known as practical jokers," the beast said.

Given the species name, you wouldn't think I'd need to be told that. But the Joker was a tall, spindly creature with dead-white skin partly covered with green hair or moss, and a triangular, somewhat manlike face with a jutting jaw and a permanent grin. I'd thought, *Batman reference*, and my brain stopped working. No alien would have thought to warn me of *that*.

I'd got to talking to the Joker. He sounded like someone dancing on a bagful of walnuts, a rattling sound, but his translator took care of that. He seemed intelligent, interested. I told him about running the tavern. He talked freely, it seemed, about his own background and species. A hotter star than Sol, a planet with a longer year, cultivated land losing fertility . . . His pets were a

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little whiny and not quite housebroken—

I asked, "Were you drugged?"

"No, not drugged. We are Pazensh. We grow intelligence when we come into heat."

"Really?"

"Yes, we need intelligence to seek and find and test a mate. At other times we survive on reflexes and paranoia. You—?"

"With us it's pretty much the other way around," I said. I had no mate right now; Jehaneh was visiting family in Iraq. "And you chewed up a stool. The Joker paid for that, but the Bebebebeque on the stool had to leap for its life. I never knew it could do that." The big yellow bug had jumped about four meters.

The Pazensh said, "I remember not quite enough about last night, but it ended with a whiff of female scent, and a door that closed and locked. It took me some time to gather my wits, and more to solve the lock and get out of the lander. Then I followed her scent here. Here I find my own scent, and scents of many species, and now I must ask how badly I've embarrassed myself."

"Nothing we can't handle," I said. "I've done this dance before. Let's see . . . you didn't use the rest rooms, but that happens with other species too. They can be complicated. The little bug's okay . . ." And it wouldn't matter much if the Bebebebeque had been eaten; they're a hive species. "All's clear."

"Good. Now I must find my mate." The Pazensh started to climb over the bar.

"Hold up." I showed him the stun. "What are you doing?"

He stopped. "Following a scent trail."

"One of your females is back behind my bar?"

"Is or was." The Pazensh settled onto a stool. His many-toed feet dangled; the long toes thrummed with his eagerness. "Name me Hass. My companion, my will-be-darling, she is Tenshir. You?"

"Rick."

"If we were more than one female and one male, I would smell it. Tenshir is using your establishment as a—" The translator hiccoughed, then said, "breeding maze."

I said, "Hass, we have laws to block your mating against your partner's will."

"When I have found Tenshir, you may ask her wishes. For now, she must test my intelligence."

"You're following a scent trail of pheromones. That's intelligence?"

His toes stopped moving. "That doesn't make sense, does it? Following her scent will hardly engage my mind. But she has marked the domain, the perimeter of the breeding maze. She is here and I must find her." Hass surged over the counter and down the stairs into the storerooms, running on all sixes. I followed his path with the point of the stun, but didn't fire.

If I'd seen a Chirp, I'd have asked for help. There were ten varied aliens in the bar, all staring at me, most of them unfamiliar species. And Rory was at the service window. "Boss? Three silvers for the Wids, unless you're—"

"Rory, take over." I didn't like doing that. The tavern can run a crew of up to six residents plus day help, but this year's interstellar liner was a small one with less than a dozen passengers. Miranda, on duty last night, was sleeping it off. Only Rory was on available.

But Hass wasn't the only one getting an intelligence test here. I donned an air filter and kept the stun. I walked down the stairs slowly, giving myself time to think.

I couldn't just let Hass run loose here. My staff wears air filters when they come to the basement for drinks and edibles. It was a maze even to me, but a maze of stocks for more than fifty alien varieties who had visited the tavern at various times. Most of what feeds one life form would be poison to a score of others. Chemicals were in the air.

It was cold down here. Siberian temperatures are good for storing a lot of

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my stocks; others have to be chilled, heated, pressurized or irradiated. I caught a whiff of Hass's scent, but not enough to guide me. I followed a scuffling.

"Hass," I called, "how long is this likely to take?"

"A breeding maze? There is no telling. Hours or days, perhaps."

"Are you allowed to get help with this?"

Still unseen, Hass answered. "Any may help. This is a mating maze, not—" The translator hiccoughed. "—an entertainment. The stakes are the highest. If I can trust a companion, it speaks for my intelligence. If I choose one who will mock me, or a fool who will lead me astray, that speaks too."

"Okay."

"Rick, is the Draco Tavern a successful concern?"

I chuckled. "Yes." *My* intelligence test.

"Good. I trace your scent and hers, and several other human and Chirpsithra. Does that match—"

"Chirpsithra come down here, sure. All my staff is human."

"And a Joker was here."

I'd been thinking about the Joker. Given what I knew now, he'd learned more last night than I was comfortable with. Time I found out something about him. I used my translator to call *Shock Layer*, the Chirpsithra liner currently hovering near the Earth's Moon.

I got an answering device. "I'll talk to any member of the crew," I told it.

"Hi, Rick. The crew is dealing with internal matters. You have not clearance."

"Search the passenger lists for Jokers." I spelled it in the Chirp language, as best I could.

"Joker. One passenger, Hsenshesist Brill, adult male, restricted to ship."

"Hsenshesist is on Earth," I said.

"That information is restricted." Pause. "I have upgraded your clearance. Hsenshesist Brill has gone missing. Where is he now and what is he doing?"

"He's in the vicinity of the Draco Tavern. He's running a scheme of some kind. What are his capabilities?"

"It was not expected that he could board the lander. He is barred from Earth. We must upgrade his capability estimates. Keep me informed," the mechanism said.

I disconnected. I whispered to my translator to get a hologram map of the cellar. A skittering told me Hass was running above me along the stacks of boxes, left, down, left again and up and back toward me. I broke into a jog, the hologram glowing ahead of me like a complex flashlight beam.

"Your help has been of little use," Hass said. He was over my head.

"Slow down."

"Tenshir will not slow!"

"She'll be faster than you. You have to stop to sniff. You'll never catch up unless you guess where she'll be. How would she break a scent trail? Can she fly?"

"No, not without an aircraft or lift belt. We do not use mechanical aids for this, barring what our hands can make. You see me naked, yes? She will be too."

"Can she jump long gaps?"

"She might make four meters. I would still scent her."

"Will she have help?"

"Hsenshesist Brill must have thawed us at the same time. The med system that held us was in the lander, and the scent led here. Snowfall might have disturbed the scent trail. Who would we meet on the path to the Draco Tavern? You," he answered himself: the obvious suspect. "And a female human server. Has Tenshir approached you?"

"No. And it's Jennifer's sleep cycle, and you didn't come near her last night."

A long low, modulated snarl. The translator said, "Did Tenshir speak to you of a stalker with rape in mind? And beg help?"

I repeated, "No."

"Last night, who else did we approach?"

"Things have been pretty dead this trip. There were only seven or eight cus-

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tomers last night, all at one table. Brill tried to join them, but got yelled at."

"Do you think she's alone, then? Rick!" His voice dropped as if she might be in earshot. "The toilets!"

"Right. Here, these steps lead out."

I store some stocks outside in the Siberian cold. Animals won't come near the weirder chemicals, and the temperature stays low enough. Housing for human staff forms an arc partway around the dome. The toilets are outside too, completing more of the arc.

Hass dashed ahead of me.

"Humans have a poor sense of smell," I said.

"How I envy you." But Hass's spongy tip of a nose was in the air. "Like a chemistry lab. These two booths are for Chirpsithra. This for several types; a Joker has used it. This one I could use, or Tenshir." He sniffed. "Tenshir has not used it. Some Tiktik have."

"How long can she hold her wastes?"

Hass spoke; the translator said, "Two days or longer." A sudden yip. "Rick! The ceiling!"

In the booth that a Pazensh might use, I looked up at an alien pictograph: a hundred tiny symbols arrayed in a near-ellipse. I said, "She didn't use this booth except as a drop."

"She got in ahead of the Tiktik and hoped their smell would cover hers. My mate is clever."

"What's it say?"

"'When zeeft fayristtent waves' . . . it's a puzzle. It won't work in your speech."

While he worked on the puzzle, I called *Shock Layer* again. "How often does a Joker need a toilet? Which toilet would he use?"

The answering device said, "A Joker must void liquid wastes once every three hours or so. Stony solids, up to ten standard days. Gullet stones, every five hundred days. Number hash mub delta." Fourth booth to my right. "Have you data for me, Rick?"

"He's been here. What motivates a Joker? Why did this one board a Chirp ship, and why did they let him on?"

"Hsenshesist Brill is a famous xenopsychologist. Ship law restricts him because he runs uncomfortable experiments on sapient entities, but his lectures rank high. Many will attend when he tells us what he has done on your world."

"What will he do? Knock down a building? Nuke a city and study the survivors?"

"He will do nothing harmful. Deaths would place him in a new category, outside the protection of citizenship. Hsenshesist Brill is not deemed mad."

"Good." What then? Would he start a career as an alien rock star and study the groupies? Go into politics? Crash the stock market? Smuggle something alien, like Glig medicines?

"Liquid wastes?" I asked, "Are they easy to track?"

"I have specs for your local toilets. He could use those."

Dammit. I disconnected. "Hass?"

"The puzzle is incomplete," Hass said. "It's as if she stopped when almost finished. Why would she do that?"

"Drew the rest of it elsewhere." The ellipse of markings had a bite missing. "Fits here." I looked hard at the oddly configured bowl that was the centerpiece of the cubicle. Detergent spray from here, warm air from here, two-stage flush, outlet underneath. It was in my mind that if I wanted to hide a puzzle from a human woman, I'd draw it on the bottom of a toilet seat . . . but I couldn't see anything analogous here.

The puzzle had me in thrall. I went outside. Piled snow allowed me to crawl onto the roof. The roof was covered with packed ice, and no patterns had been carved into it.

Hass wouldn't carry a heater—no store-bought tools—but he might make a scraper to get through this ice sheet to reveal a message. "Hass? You've been telling me she wants to be caught. We're not looking for anything terribly diffi-

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cult. Hass?"

Nothing. I got off the roof and looked into the cubicle. The Pazensh was gone.

So the question was, did I want to lead Hass to Tenshir? We weren't looking for the same thing. Puzzle aside, it wasn't my species' problem. Further—despite the appearance that she'd left a message—it was still possible that Hass was a stalker.

What I wanted was to find the Joker. Whatever devilment Brill was planning on Earth, he'd played me for a fool last night.

He could use a men's room, or a ladies', but he couldn't pass for human. Where could he hide and still accomplish anything?

We sometimes use pressure suits for a cleanup. I went back in and put one on. Now a Joker couldn't smell me. I went back to the appropriate toilet, hash mub delta, and set a tiny security camera.

He'd need food . . . but the age of terrorism has not quite faded. There were already cameras in the tavern's food preparation area.

It couldn't be this straightforward. Think of something else.

I hadn't needed to call *Shock Layer*. All of my possible customers are in my registry before they ever reach the tavern . . . but Brill wasn't supposed to have come here at all. Hmm? I used the translator to look him up, and there he was.

Physiologically and chemically, Brill was a tee tee arrowhead slant ool, which meant he'd have to carry supplements: pills or a needle. Otherwise he could get what he wanted at any market. Of course, any market clerk would see him for an alien. He wouldn't be too conspicuous if he stayed in the Mount Forel Spaceport area, unless someone called the cops. Me or any Chirpsithra officer. Could he risk that?

Aliens did often possess special, valuable knowledge. If Brill left the Mount Forel area, he might persuade someone that he had, say, the secret of immortality. Hell, it might be true: he might have got it from a Glig. So someone outside might hide him—

But what did he want with the Pazensh?

For the first time, I wondered if Brill might have taken the Pazensh female. (For what?) And left Hass behind. (Why?) But if there were a scheme involving the Pazensh, he'd have to hang around. (Where?)

Actually, to a Joker, that might have an answer.

I stripped off my pressure suit behind the bar. "Rory? How's it going?"

"Rick, the Wids want to try sparkers. Shall I? I thought sparkers were just for Chirpsithra."

"Sure, and alcohol is just for humans, but a lot of aliens want to try liqueurs. I always, always check their registry." I reset the translator. "There. Wids are ahn tee hatch nex zep. It won't injure them." They wouldn't like it, though.

He took a couple of sparkers and went, and noticed I was following him. Under a sound suppressor, I stopped him. "Rory, you weren't in last night. There was a Joker, name of Brill. It's a fugitive."

"Isn't that up to the Chirps?"

"If I'm right, it's our problem too. I'm going back to my room. If anything more goes wrong, call *Shock Layer*. This is what you tell them . . ."

Rooms for the staff are roomy enough, and the communal complex includes a pool, some exercise equipment, stuff you'd expect at a mid-level hotel. There's also quite a lot of security stuff. Staff knows and accepts that I can use a screen in my room to spy on them to a certain extent. Brill would not.

Brill had learned that most of the staff complex was empty. Of course, he could be hiding on the endless miles of tundra, but where was the humor in that? And Jokers like it warm. Hiding in the staff complex would be a fine joke

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on me.

Where? Another species might have chosen the pool or spa.

He might have captured Miranda and taken her room, if he thought she might stumble across him.

I'd told Brill about Jehaneh. My bet was that he was in her room: my own mate's room.

I hesitated outside the door to my apartment, stun in hand. I opened the door and, for an instant, froze. Another Pazensh was there, partly embedded in something like lime Jell-o. Tenshir wriggled, and I swung left and right with my stun held high, and Brill's stun got me first.

I was still standing up, stun held high, every muscle rigid in spasm. I concentrated on breathing. It was too slow.

The spindly green-and-white Joker eeled out from under my breakfast table and looked me over. The grin didn't change, and he didn't laugh. He stepped toward my door and I heard it close and lock. Something flew past my ear. I heard two solid impacts, one as it hit, one as Brill fell.

Hass ran past me. I heard another thud, and more. If Hass could have used my stun, Brill would have been a lot better off.

Locked in a full-body cramp, I listened to the lovers talking.

Hass asked, "Do you know a way to get this stuff off you?"

"Only one way. Think of it as the last test."

"The tavern tender must have left word that he would search here. He's certainly that bright. In an irritatingly long time, some Chirpsithra will arrive to free us and reclaim the Joker."

"That's my best answer too. Dear, how did you find me, with the puzzle incomplete and myself in the wrong place?"

"First I looked for the rest of the clue, but nothing was there. I thought it must be that you were interrupted. We met none but two humans and the Joker last night. Jokers are notorious. Leaving me a broken and empty breeding maze would be a hoot.

"Rick was hunting the Joker. I can't use any tool I don't make myself, but Rick can. I followed Rick. His scent trail disappeared when he put on a pressure suit, so I had to work out where he'd take such a thing and follow him by eye."

"You let this local do your tracking for you?"

"I did."

"Darling, that's brilliant!"

"He spoke of the staff housing. I found the Joker's scent there. I found a broken lock. I went through to the pool, then a complex of rooms with Rick's scent and a female's. I lurked with a water flask in hand until Rick provided a distraction."

"Nice toss."

"Thank you."

"I had such a nice puzzle laid out for you. There was so much more. Did you find the sticks?"

"No, I went straight to the toilets."

"Look them up later."

"I wish I could break you loose from the police goop."

"Minor foreplay?"

I hadn't thought other life forms were as versatile in their petting as humans. Things were getting interesting when the door behind me was blasted open and two identical Chirpsithra came in. One sprayed me in the face with something acerbic. Gradually my frozen muscles relaxed. The other set some humming thing against the green jell, and that melted away from Tenshir.

They put the Joker on a float plate and one Chirp took him away. The other stayed. I thought she would question me, but she did it her way. She led me back into the bar, leaving the Pazensh to use my rooms as they saw fit. She got me to sit down at the biggest table, me with an Irish coffee and her with a sparker, and I told the tale to every entity in the tavern. ■

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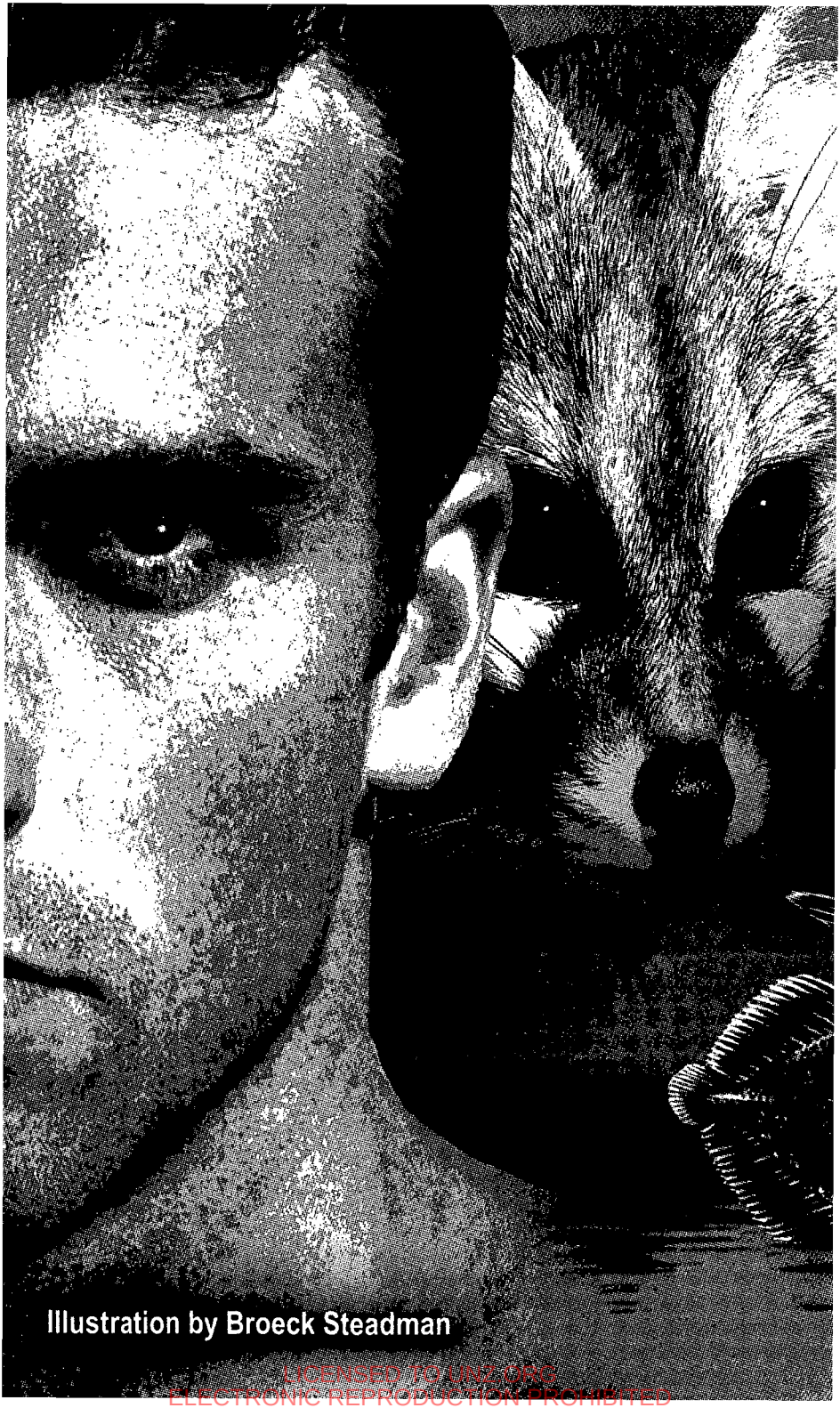

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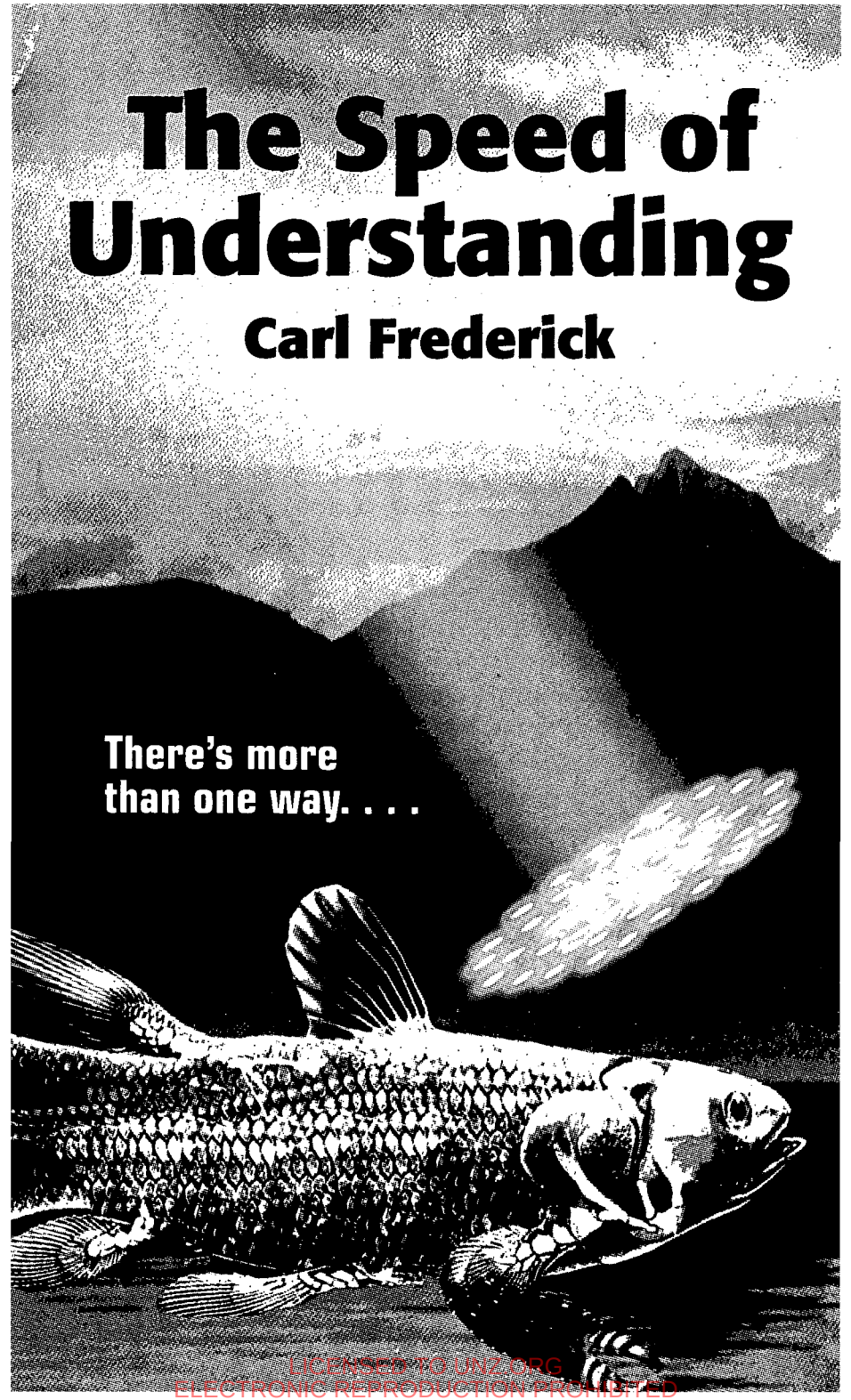
The Speed of Understanding

Carl Frederick



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On the low, coastal promontory a mere kilometer from CAT-5 base, under the guise of doing research, Paul played with his canoid.

"Fetch, Max," he shouted as he threw a blue-fern twig. In the low gravity of Rau's Planet, the stick spun lazily through the cloudless sky while Max ran underneath.

The spectral class F9 sun stood high in the sky, as indeed it would for the next thirty or so Earth hours. And it was hot; Rau's slow rotation speed produced Mexican days and Canadian nights. Otherwise, Rau was perfect: biology and ecosystem compatible with Earth's, rich with natural resources, a good ionosphere and ozone protection layer. Paul had no doubt that Colonization Approval Team Five would certify it fit for human habitation—unfortunately.

Watching his canoid run with its otter-like gait, Paul shook his head. He had to admit it; canoids didn't have language, weren't sentient, and therefore their planet was fair game for colonization. But Paul cared not about colonization, but about language.

Max retrieved the stick and Paul, crouching, patted the creature between its ears. He'd named it Max after the Springer Spaniel he'd had when he was a kid. Not that he was exactly old now, but he was pretty close to getting his Ph.D. and that meant the end of his life as an explorer. By tradition, CATs took along a theoretical exolinguistics graduate student: young enough to retain the lingual plasticity required to learn an alien language—should one ever be found.

"Yeah, Maxy," he said, resigned to the idea that the canoid couldn't understand him, "it's all downhill from here." He chuckled knowing full well that his employment had nothing to do with lingual plasticity. He was a grad student; he knew about slave labor.

At the sound of the laugh, Max reached up with one of its raccoon-like hands—four-fingered, like some cartoon animal. The canoid patted Paul's face. Although the creatures looked more feline than canine, they had a dog's desire to please. And besides, Gottfried, the team geneticist, used the term "top dog" for the animal on any planet that was at the top of the food chain. In the sea the lucifish reigned, in the air the batwings, but the canoids were indeed the top dogs on Rau's Planet.

Paul tousled Max's mane, conscious that he was becoming very fond of the creature—too fond in fact, for there was no way he'd be allowed to take the ocelot-sized creature back to Earth with him. Yes, Max wasn't sentient, but he was a great pet. Originally, he'd been kept in the land-fauna pen with the other specimens, but now he had free run of the encampment.

A shadow passed over them. Paul looked up to see a lesser batwing flying off toward a kelp-tree jutting up from the coastal sea. Though the blades fell freely, littering the harbor with thin blotches of green, the batwings seemed to prefer their kelp directly from the trees.

In the water below, Paul could see a few lucifish. The sunlight glistened off their mirror-like scales as they nibbled at the floating kelp, the main element of diet for batwings and lucifish alike. As for the canoids, they were for the most part, like Paul, vegetarians—the exception being that when lucifish died, they floated to the surface and drifted to land where the canoids ate them. There was an odd sort of symmetry there, for when canoids were near death, they instinctively crawled to the water. There, they were eaten by lucifish. Gottfried, the team's biologist, said he was puzzled why, with the abundant life on the planet, the dominant land and sea creatures had evolved to devour each other?

Gradually, Paul realized that the scene he watched had lost nature's randomness. The lucifish were no longer eating the kelp, but instead were methodically

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sweeping it out of the way. At the same time, a huge silver disk had formed beneath the surface. By squinting, he could make out that the disk was comprised of countless thousands of lucifish, all their thin, flattened bodies virtually in contact.

Paul stood from his crouch and, his nose wrinkled in wonder, stared open-mouthed as the disk rose to the water's surface. Then the center of the disk dropped, creating a great mirror-like bowl—a shaving mirror some half-kilometer or thereabouts in diameter. The bowl, like a solid object, moved, changing its angle to the water. A brilliant, blue-white, flickering spot of light appeared thirty or forty meters above the surface. Paul gasped as he recognized it as a lesser batwing. The creature was at the focus of a giant solar oven. For a mere second or so, the batwing struggled, swooping and whipping the air with its wings. Then, smoldering, it fell with a smooth trajectory to the water.

"Geez!"

Paul glanced down at Max. The canoid, its oversized eyes locked on the disk, had clearly observed everything—and would doubtless remember it. There seemed to be an area of the brain for something like gene sequencing, and Gottfried had suggested that canoids record their memories on long DNA-like molecules. He'd said that, apparently, canoids replay their memories by running the molecules through the sequencer like film through a movie projector. Paul fervently wished he had that projector and the film. The CAT would not believe what he'd just seen.

"Come on, Max," he said, turning toward the CAT pop-fabs visible in the distance. "I'd better report this."

Paul let Max run free in the base confine, and then went to look for Vanessa, the CAT leader and shuttle captain, and for Gottfried. As for Neville, biologist cum team physician, he was probably still off island-hopping in the ultralight.

Paul checked the command pop-fab. They weren't there. Then he found them—or rather, his nose did. Following a nauseating odor emanating from the kitchen/dining fab, he came upon Vanessa sitting at the dining table, an empty plate in front of her, and Gottfried, standing at the cooking unit pouring sauce into a skillet.

"Come in, my boy," said Gottfried, gesturing at Paul with a spatula. "Nothing like the aroma of fresh fried fish."

"No," said Paul. "Nothing."

Gottfried laughed. "Lucifish," he said, "ugly, but better than the best lake trout you've ever tasted."

"I've never eaten a trout."

"The editorial 'you,' my boy." He chuckled. "You don't know what you're missing." Gottfried turned back to his cooking. "And they're damned easy to bag. Zap 'em with a laser gun, and they just float to the surface."

Paul glanced at the sideboard where two lucifish lay gutted. The creatures were horned and hideous, with a flat body like some exotic aquarium fish and catfish-like whiskers with bioluminescent spots at their tips. They had claws rather than flippers. The claws had stingers, but the venom seemed only to affect canoids. Gottfried had named the creatures, lucifish. He'd said that they looked like Satan would have looked if he'd been a fish.

Vanessa motioned him over. "Come and join us. I'm sure Gottfried will be glad to fry up a tofu-burger or something for you."

Paul declined the food.

"Join us, anyway." Vanessa indicated a chair. "Gottfried was just filling me in on his latest findings." She pulled back the chair. "Some interesting points about canoid and lucifish genetics. And communications, too. It's not language, of course, but it seems the lucifish communicate by way of their bioluminescence."

Paul sat. "Maybe it *is* language."

"Wishful thinking." Gottfried, skillet in hand, came to the table and divided a lu-

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cifish filet between his and Vanessa's plates. "The lucifish brain is just too simple to handle language"

"After what I just saw," said Paul, "I wouldn't be so sure." He described what he'd witnessed from the promontory.

"You're sure of this?" said Gottfried.

Paul nodded vigorously. "Yeah."

"But that doesn't make any sense," said Gottfried. "Lucifish don't eat batwings."

"Didn't eat this one either. When the batwing hit the water, the Lucifish just, well, dispersed." Paul, embarrassed about what he was about to say, looked down at the tabletop. "It was almost as if it were a deliberate act—like a weapons test."

"Weapons test?" Gottfried gave a collegial laugh. "In my experience, what seems premeditation"—he tapped the table for emphasis—"is usually just reflex."

Paul glanced over at the team leader. Eating her filet almost mechanically, Vanessa seemed deep in thought. Gottfried must have noticed it as well, for he put down his fork and stared at her with a look of patient expectation.

After a half minute or so, Vanessa crossed her hands on the table. "A batwing is not all that different from an ultralight," she said, softly.

Gottfried's eyes widened. "You're not saying that you believe that—"

She held up a hand. "No. Not necessarily." She stood, took her plate and utensils to the synth-reprocessor, and dropped them in. "But just for safety, I think we should warn Neville."

They left the freestanding dining facility and walked to the command pop-fab. Inside, Vanessa flipped on the transceiver. "Neville," she said into the microphone, her voice casual. "Everything okay? Do you read?"

The communications was via radio relay from a satellite in geosynchronous orbit. But because of Rau's slow rotation period, the satellite was over a hundred thousand kilometers distant. And that made for about a half second round-trip signal delay.

"I'm here," came a voice from the speaker—Neville's. "Just lifting off from the last island in the chain. But there's something a trifle odd here. Looks like a huge metal disk—"

"Go back!" Vanessa practically shouted into the microphone. "Now!"

"Why?" came Neville's voice, a tad delayed. "What is the trouble?"

"Get out of there, Neville," said Vanessa, her voice brooking no argument. "Land immediately!" She thumped her fist down on the console. "Damn this signal delay!"

"All right then, but ... Oh my god!"

After a few seconds of silence, Vanessa asked, "Neville. Are you okay?"

There came no reply.

The three of them stared at the speaker.

"Neville," Vanessa clutched the microphone. "Neville. Do you read?"

Still nothing.

"Neville. Come in."

After another minute with no response, Neville's voice sounded from the speaker. "Could you tell me what the bloody hell just happened?"

Paul let out the breath he didn't even know he'd been holding and Gottfried slumped down into a seat.

"You tell us," said Vanessa, looking at the microphone as if it were a sentient being.

"A white light enveloped me," said Neville. "A searing brilliance. I cut power for an emergency descent. If I hadn't gotten into the shadow of a blue-fern ..." There came a pause, then Neville continued. "I would have been—what is the North American term?—toast. The blue-fern is now a black-fern."

"Is the ultralight still flyable?"

"Seems to be," said Neville, after a few seconds, "but I can't say I'm overly eager to attempt it at the moment."

"Good," said Vanessa. "Stay put. We'll radio you when we have a plan."

"Understood. But could you please inform me what the devil is going on?"

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Vanessa handed over the microphone. "Tell him, Paul."

Fifteen minutes later, they'd concluded that Neville would have to wait until sunset and then attempt to fly back. It would be risky; after sunset, the winds came, and the ultralight was an unpredictable vehicle in a wind. They'd considered rescuing him with the shuttle, but there wasn't enough fuel for that. And the mother ship was off exploring other planets in the system. A ship several light-hours away was in no position to help.

With forty hours to wait, Neville "talked shop," the signal delay making the discussion seem academically dispassionate. "Perhaps our young colleague is correct," he said over the radio link. "Maybe the lucifish are our long-sought-after sentient species."

"It is difficult to believe," said Gottfried. "Their brains are just too simple."

"A collective intelligence," said Neville. "A super-organism. Some researchers think ants might be such an intellect."

Gottfried laughed. "Next thing you'll be telling me is that a forest is a super-organism, the trees are neurons, and the signals are being carried by squirrels."

Neville laughed as well. "Squirrels as neurotransmitters. Interesting idea. Still, shooting down a batwing does rather speak of intelligence."

"Shooting down batwings is just a reflex," Gottfried insisted.

"Perhaps we should try a series of prime numbers on them," said Vanessa.

"And how do you propose to do that?" said Gottfried.

"Light pulses, maybe."

"They do seem to respond to the light flashes from other lucifish," said Neville. "In fact, the lucifish might actually be the equivalent of neurons, and the flashes neuronal signals."

"Please." Gottfried shook his head in obvious disgust.

"Why are you simply ruling out intelligence?" said Neville. "At least as a hypothesis."

Gottfried glowered at the microphone. "How could an intelligent organism evolve without artifacts? How could it study science, create literature—not to mention art? And besides, they reproduce asexually. That doesn't exactly point to a high degree of development."

"We're being rather anthropocentric, aren't we?" said Neville.

Gottfried ignored the comment. "And for that matter," he said, "is it art if only the artist can experience it?"

Vanessa cleared her throat. "Perhaps we can postpone the philosophical discussions until a better time."

"Fine," said Gottfried.

"Still," said Neville, "there's no harm in trying prime numbers. Shooting down batwings might be reflex, but responding to primes, I hope you'd agree, would show intelligence."

"Uh-oh," said Paul. He'd been listening to the conversation, but his eyes were on the computer monitor. It showed an image of Rau relayed from the satellite's camera.

Vanessa glanced his way and he pointed to the screen. She leaned over to look. "What is that?" She pointed to a pale-white, circular blotch.

"It looks like a weather disturbance—like a hurricane."

She pulled the keyboard over and magnified the image. "Perhaps. I wouldn't have thought hurricanes were possible with Rau's slow rotation speed."

"What's happening, please?" said Neville.

"Nothing, I hope. Some heavy weather off to the south." Rapidly, she typed in some commands. "I'm bringing up an earlier image."

"Is it coming our way?" said Gottfried.

"Checking that, now." Vanessa brought up a second image next to the first. "Neville," she said while typing. "How much elevation above sea level do you have on your island?"

"Not much. A few meters, perhaps. Why?"

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"I'm not sure yet, but it looks like some sort of a hurricane is headed right for us. And a few meters might not be enough."

"Oh, dear," said Neville, his usual bantering tone gone. "When will it arrive?"

"I don't know yet." Vanessa brought up a measurement grid onto the screen. "I'd say before nightfall, certainly. This could be serious." She increased the magnification. "Sharply defined storm region. You'll have to get off the island before it hits."

"Shouldn't be a problem," said Neville. "When the clouds come up, I'll fly back. Without the sun, the disk can't harm me. This hurricane actually might be a spot of good luck."

"I hope so. We'll do some more research here and then get back to you. CAT base, out." She switched off the transceiver. "If the winds come before the clouds, he's in real trouble." She looked over at Paul and Gottfried. "Comments?"

"You know," said Paul. "It's a pretty big coincidence that a hurricane is coming our way just now."

Gottfried gave a grunt of disdain. "I hope you're not suggesting that your lucifish are sending a hurricane at us."

"No." Paul felt himself wither under Gottfried's scowl. "But water temperature can determine a hurricane's strength and path. And maybe the lucifish ... Maybe they ..."

"Oh, give me a break," said Gottfried.

"I asked for comments," said Vanessa, "not arguments."

"Well," said Paul, tentatively, "I think we should try Neville's prime numbers. Maybe if the lucifish think we're trying to communicate, they'll ..."

Gottfried threw a glance at the ceiling.

"To paraphrase Gottfried"—Vanessa stared at Paul with intense eyes—"How do you propose doing it?"

"Well ..." Paul felt as if he were taking his oral exams. "I could make a flasher by cannibalizing an LED from a flashlight." Paul struggled. "And ... And we could also use it as a photodetector—so we could see if the lucifish answer. I could sink the flasher ten or twenty meters down—so it'll be dark enough for the lucifish to see it. And with a wireless controller, I could have the results displayed on our command monitor."

"You could do this?"

"Yes."

"How long will it take?"

Paul thought. "Two or three hours to make the flasher if I can find some antenna wire, and another hour or so for computer stuff. And maybe another hour to get it into the water."

Vanessa bit her lower lip and nodded for a few seconds. Then, abruptly, she turned to Gottfried who seemed to be in a sulk. "Yes, it might be wrong-headed," she said. "But what do we have to lose?"

Gottfried shrugged.

"All right," she said, again facing Paul. "Do it."

Paul hurried off. As he went through the door, he heard Vanessa talking to Gottfried.

"We have almost two Earth days," she said. "Let's find out everything we can about these lucifish."

It took Paul only three hours to design, build, and set up the flasher. But then he had doubts. How long should he wait for the lucifish to respond before repeating the sequence? He decided that the highest prime number he'd use was twenty-three. But was that too large? He wondered if he himself could reliably count that many light pulses. But any fewer, and the lucifish might not realize the pattern was primes.

Thinking about it as he walked back from the shore, he considered it very unlikely that he'd get a positive result. The lucifish might be intelligent, but the intelligence could well be too alien for his little flasher to detect it.

Paul tried to hide his doubts when he returned to the command pop-fab.

"So soon?" said Vanessa as he came

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through the door.

"It's up and running." He went to the computer and brought up a window. "This'll show any answers from the lucifish."

"You don't seem as enthusiastic as you were earlier."

He shrugged.

For the next fifteen minutes, he and Vanessa watched the monitor. There was the occasional random flash, but nothing that could be construed as a signal. Then Vanessa stood and patted him on the back. "I've got to go," she said. "Keep me informed."

Paul continued staring at the screen. Nothing. Every so often, Gottfried came in. He seemed friendly, but Paul couldn't bring himself to meet the man's eyes.

Thirty hours later, with the sun still formidably high in the sky, the hurricane just an hour away, and the winds beginning to rise, there wasn't a cloud to be seen. And Paul's prime number device showed no response from the lucifish.

"I think I'll have to make a dash for home," said Neville. "The wind is starting to pick up."

"Is the disk still there?" said Vanessa. She, Paul, and Gottfried sat clustered around the transceiver.

"Yes."

Vanessa paused for a moment, then said, "All right. But fly low to the water."

"Low?"

"We know the lucifish can target a high-flying object. It might be harder for them to focus close since the mirror would have to be more concave."

"Let's hope so." The engine revving up sounded clearly over the speaker. "I wish this thing were a bit more maneuverable."

Vanessa grasped the com console as if she were in the ultralight with Neville.

"Just a moment," said Neville. "The disk is dispersing."

"What?" said Vanessa.

Just then, Paul saw data coming in on the prime number monitor. He inhaled sharply—waiting.

"Twenty-nine," Paul shouted. "The lucifish sent twenty-nine. I stopped at twenty-three. They're intelligent."

Gottfried darted to the monitor. "My gosh," he said in a hushed voice.

Paul jumped to his feet. "And that must be why the disk dispersed. They've decided to communicate instead of shooting us down."

"Did I hear that correctly?" said Neville, his voice coming in strong over the thrum of the ultralight's engine.

"Yes. It seems you and Paul were right." Gottfried flashed a quick smile at Paul. "The lucifish could well be that super-organism."

"Well then, bring on the squirrels." Neville chuckled over the thrum. "But what the bloody hell took them so long?"

"You know," said Gottfried. "I think it's a case of both intelligence *and* reflex. The super-organism must be huge. Even with light as the inter-neural communication medium, it must take a very long time to think about something. That could be why it took them so long to respond to Paul's primes. Reflexes, on the other hand, like those needed to shoot down an ultralight, could be very fast."

"Logical," said Neville.

Paul was impressed at how quickly Gottfried had adapted to the situation.

"I know it sounds like an oxymoron," said Gottfried, "but the organism is probably brilliant, but slow." He shook his head. "It could take one heck of a long time to really communicate with it. Lots of processing power but low bus speed."

"Interesting," said Neville. "I will want to hear more when I land. Speaking of which, it would be helpful if you were at the landing pad to help me tie down this thing."

"Understood," said Vanessa. She threw glances to Gottfried and Paul. "Anything?"

Paul shook his head.

"No," said Gottfried.

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"All right." She moved her hand to the switch. "See you soon. We'll monitor your transmission. Base, out." She threw the switch from "full duplex" to "receive only."

Gottfried stood and started for the door.

"You don't need to leave quite yet," said Vanessa. "Neville won't be back for at least an hour."

"I know." Gottfried paused, his forefinger on the door-control. "But I need to take a walk—to recalibrate myself. I hadn't believed in the super-organism idea until just now." He blew out a breath. "It looks like we'll be the first CAT ever to disapprove a planet because of preexisting sentience."

Vanessa nodded. "Sentience? Not just intelligence?"

"It sure looks like it."

Paul stood. "I think I need a walk too, and for the same reason."

Gottfried, a gentle smile on his lips, opened the door. The two left together.

Outside, Max was waiting. And there was another canoid with him.

"I see Max has brought a friend," said Gottfried.

"I guess."

In silence, they ambled along and by unspoken agreement took the steep path downward toward the shore. Max and his friend followed. With a breeze moderating the temperature, it was a pleasant walk. At the water's edge, choppy waves lapped at the shore and the air had the tangy fragrance of wet kelp. The canoids, as their species was wont to do, darted in and out among the waves.

Looking into the froth, Paul said, "Hard to imagine there's an intelligence hidden down there."

"And the organism is probably not crazy about us eating the outer parts of its cerebral cortex." Gottfried stared off toward the horizon. "Who's to say it's just one intelligence? For that matter, the number of super-organisms might not be constant or even a well defined—"

Just then, an enormous lucifish leapt from the froth and threw its claws around the neck of one of the canoids.

Paul froze, both from surprise and out of fear for Max. Then, seeing that it was the other dog whinnying and struggling, Paul let out a breath and started forward to help it—but Gottfried held him back.

"While we might question their behavior," said Gottfried, "we have no right to question their biology." He pulled Paul a step further back. "God, just look at that monster!"

Max darted away while Paul, restrained by an arm around his shoulder, gazed horrified at the desperate thrashing in front of him. In a matter of seconds, the canoid ceased struggling.

"Strange," said Gottfried. "I've never seen them attack a live canoid."

The creature released its claws and the canoid flopped limply to the wet sand. Then the lucifish scuttled forward, pushing the canoid with its head.

"What's going on?" said Paul, almost at a whisper.

Gottfried shook his head. "Don't move."

The lucifish pushed the canoid to within a foot of their shoes, then turned and scurried awkwardly back into the depths.

Gottfried let out a breath. "That was the biggest damned lucifish I've ever seen."

Paul looked down at the motionless canoid. "What just happened here?"

Gottfried crouched down and examined the creature. "I think the lucifish want us to appreciate it. Like a cat depositing a killed mouse at the feet of its owner."

"Why?"

"I've an idea, but I'd like to run it by Neville, first." Gottfried lifted the soggy canoid carcass then looked over to Paul. "I'll take this back to base and pop it in the freezer. In any case, Neville should be landing soon. We should go." Carrying the canoid, he turned and started back the way he'd come.

Following behind, Paul whistled for

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Max. He walked on for a couple of seconds, then whistled again. "Max," he shouted. "Here, Max."

The canoid didn't return.

"Go on without me," said Paul after a few more steps. "I've got to find Max."

"All right." Gottfried looked back over his shoulder. "But be careful." He threw a glance at the sky. "And quick. Hurricanes aren't any fun."

"I'll be careful." Paul turned from the path created by the team's coming and goings during their month on Rau, and plowed into the virgin forest of blue-ferns, fountain trees, and snake weed. He heard Gottfried's footfalls fading in the distance.

Paul felt comfortable being alone. When Gottfried had begun theorizing about the lucifish and had wanted to hear what Neville had to say, Paul felt he was the odd man out. Despite the pains they all took to be nice to him, Paul knew he was just a lowly graduate student. And Neville, likeable as he was, treated him like a twelve-year-old. But then again, Neville treated everyone like a twelve-year-old.

Shouting for Max, Paul thrashed through the alien vegetation. After a further half hour, the sky turned dark. The wind howled among the ferns and vines and Paul could hardly hear his own calls for Max. Then the rain came—a torrential blanket of wind-driven wetness. *This is hopeless.*

He spun around on his heels—just in time to see an immense blue-fern falling towards him. He jumped sideways and avoided the trunk—but not the branches. A frond whipped him across the side of the head. Falling, he felt his consciousness ebb away and light vanished from his world.

Awareness returned. Paul, cold and wet, forced his eyes open. He was half under water, his head resting on a rock above the surface. But that stone had done damage when he'd fallen. Without moving his head, he could see a rivulet of blood trickling down the rock to the surrounding water. A movement at the extreme of his vision drew his attention. With considerable exertion accompanied by pain, he turned his head. There, not a half-meter away, a huge lucifish waved its light-emitting tentacles and, its claws pawing at the air, sipped up the blood-laced water. Sitting next to the lucifish, Paul saw a canoid. It wasn't Max. The canoid stared at him with vacant, brown eyes.

By reflex, Paul sat upright. The two creatures in front of him seemed now equally alien—equally . . .

Sitting up had not been a good idea, for a great dizziness came over him. And with the vertigo came the hazy notion that he'd just gotten a big idea—but he didn't know what it was. He fell back and, once again, felt consciousness slip away.

First, Paul smelled the dryness of his surroundings, and then sensed the softness enveloping him. He opened his eyes and saw Neville. The doctor held the disk end of a transdermic injector against his exposed arm. Paul heard the explosive swoosh as the transdermic did its work. "Ouch", he said.

"Ah," said Neville. "You're awake."

"Yes, sir," said Paul, weakly.

"Sir?" Neville set down the injector. "We're being a trifle formal, aren't we?"

Paul chuckled.

"There, that's better." Neville moved to a side panel and pressed a button. A section of wall went from milky white to transparent, letting in a torrent of light from Rau's sun high in the sky. There were no clouds and the landscape looked freshly scrubbed, but dry.

Paul realized he'd been out a long time. Then he remembered Max. He pushed himself to a sitting position and as the bedclothes fell away from his chest, noticed he was naked. That embarrassed him. He wondered who'd found him and tended to him. He hoped it wasn't Vanessa.

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"What happened?" he asked while pulling the covers up over his shoulders.

"Max found you in the woods," said Neville. "Good thing, too. Another hour or so and you might have frozen to death."

"Max. Is he all right?"

"Better than you are." Neville chuckled. "Or better than you *were*, at any rate. Then Max found Vanessa, and single-handedly, she carried you here."

Paul felt himself flush.

"Youthful modesty." Neville smiled. "She has a son almost your age. Mothering comes naturally to her."

"Have you learned anything more about the lucifish?" said Paul, trying mightily to change the subject.

"Only a few facts of any consequence. But thanks to your insight, we're now able to connect the dots."

"My insight?"

"Brilliant, if I may say so." Neville furrowed his brow. "How did you come by it?"

"It?"

"When we brought you in, you were delirious. You kept repeating 'canoids and lucifish, together.' Eventually, we realized what you were trying to tell us: the lucifish aren't the super-organism, but the lucifish together with the canoids *are*." Neville nodded. "When we considered your idea, everything fell into place."

"Tell me." Paul, still weak, flopped back down on the bed.

"We know," Neville began, "that the canoids and the lucifish both have brain organs that act like gene sequencers. And they both seem to store memories—long-term, archival memories, we think—in complex molecules rather like our own DNA. Many, if not most, of these molecules end up in the blood stream. Further, both species eat each other's dead. The canoids benefit by having a supply of concentrated nutrients—a good supply as there are far more lucifish than canoids. As for the lucifish, the canoids are not mainly their food. The canoids are their books—"

"What?" Paul sat up again.

"... and perhaps even their art museums."

Paul stared, open-mouthed.

Neville, obviously amused, showed a thin smile. "Or so we conjecture. Interesting, yes?"

Paul gave a few quick nods.

"When a lucifish eats a canoid," Neville continued, "we think the memory molecules in the canoid blood are processed by the lucifish's sequencer. In other words, the lucifish can experience the canoids' memories. And they likely share those memories with other lucifish."

"Through language?"

"Not in the conventional sense. With their bioluminescent organs. More like inter-neural signals." Neville began pacing, as if he were lecturing before a class. "Now here's where it gets interesting. We've found that when a canoid eats a lucifish, the lucifish memory molecules do not stay in the canoid bloodstream. We've found concentrations of them in their reproductive organs. The molecules apparently penetrate cell walls and attach themselves to chromosomes in the mitochondrial bodies—sort of like the introns, the junk, in our own DNA." He paused in front of Paul's bed. "Odd, isn't it, how on the sub-cellular level, their biology is so similar to ours?"

Paul nodded and Neville resumed pacing.

"Those memory molecules replicate with the chromosomes," said Neville, "and they're passed to the canoid offspring."

"Geez," said Paul. "So the canoids inherit the lucifish memories?"

"Apparently not," said Neville. "At least the canoids don't experience them. Or so we conjecture. The mitochondria seem to play no part in canoid function. On the other hand, when a lucifish eats a canoid, an enzyme breaks down those mitochondria and those lucifish memory molecules get released into the luci-

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fish blood stream."

He leaned against the back of a chair and stared at Paul. "You do see the significance, yes?"

"Well, actually, I'm not all that familiar with—"

"The canoids are probably a repository for lucifish culture," said Neville, his eyes gleaming with academic fervor. "The analog of books, art, music. Who knows what could—"

Just then, the door opened and Gottfried stuck his head in. He glanced quickly at Paul, and then looked expectantly at Neville.

"Just bringing the patient up to date with our research," said Neville.

Gottfried chuckled. "So, my boy," he said, "read any good dogs, lately?"

"Very funny," said Neville, wearily.

"All right then," said Gottfried. "Eat any good books, lately? I often devour a good book."

"Enough!" Neville practically shouted.

"All right," said Gottfried, lightly. "I know when I'm not wanted." He glanced over at Paul. "Glad you're feeling better." Gottfried's head disappeared from the doorway.

Neville continued as if Gottfried had not intruded. "You'd think," he said, "that after many generations, these mitochondrial chromosomes would grow excessively large. But they don't. We hypothesize there's some mechanism to keep the size in check by dropping off the oldest nucleotides." He glanced over at Paul. "I don't blame you looking stunned," he said. "This is a lot to take in at one gulp." He started toward the door. "I told Vanessa I'd let her know as soon as you were awake."

"Could you get me some clothes first?"

"In the drawer under the bunk." Neville waved genially, and left.

Paul had barely gotten dressed when there came a knock at the door and Vanessa entered. Max followed her in.

"Paul," she said. "You should be in bed."

There was no sense arguing; she sounded like his mother. He got back into bed and sat on top of the covers with his feet stretched out. Max jumped onto the bed and Paul patted him.

Vanessa pulled up a chair.

"Thanks for taking care of Max," said Paul, scratching the canoid behind its ears.

Vanessa smiled. "Did Gottfried and Neville bring you up to speed?"

"Yes."

"Then you know the mother ship will be here in seventy-five hours."

"No. I didn't know that." Paul stopped patting his canoid and stared quizzically at Vanessa.

"We had to keep you in stasis for some time," said Vanessa, "until your body had a chance to heal."

Max forced his head under Paul's hand.

"Maxy." Paul gave his pet a quick hug, then resumed scratching the canoid's ear. "I'm really going to miss you."

"No, you're not," said Vanessa.

"Excuse me?"

"He's yours. He goes with you."

"Really? You mean it?" Paul realized he sounded like a happy kid.

"Really."

Paul wrinkled his nose. "Why?"

"We have documents telling everything about an alien culture." She sighed. "And we may never decipher them. Unless you and the lucifish come to an understanding."

"By documents, you mean a frozen canoid."

"Yes. The lucifish obviously wanted you or Gottfried to ... to read it. The second document is a frozen lucifish saved from the kitchen."

"Wait a minute," said Paul. "What do you mean, 'unless we come to an understanding?'"

Vanessa stood, walked over to the now transparent wall, and looked out onto the planet. "You have your work cut out for you. Four or five billion nucleotides and barely a clue as to what

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they signify. Raw language." She looked back at Paul. "And since you're a veggie, you've never eaten one of them. That probably will be a point in your favor."

Again, Paul wrinkled his nose. He had the feeling he was missing something. "What does this have to do with Max, or with me for that matter?"

"Gottfried tells me that a canoid's lifespan is probably about twenty years."

Now Paul was sure he was missing something.

Vanessa regarded him for a long moment without speaking. Then she said, "You're a good person, Paul. Innocent and too young to be cynical. You'll make some woman a fine husband. And you'll be a good father."

Paul felt himself blush. "But what—"

"And your dog will learn everything about you. You can't keep secrets from your dog—not this dog."

Paul struggled for comprehension.

"Oh, you'll get your doctorate." Vanessa came over and sat at the foot of the bed. "And then a post-doc. We've already recommended you for one." She gave his knee a maternal pat. "When Max dies, we'll return him here—to the water. When the lucifish absorb him, they'll learn about humanity at its best. We got off to a bad beginning with the lucifish, but maybe we can start afresh. When they understand you, perhaps they'll give us the chance—give *you* the chance. If they're indeed as brilliant as we think, they'll figure out how to communicate with you. We'll wait for that to happen. This is too important to rush."

As understanding came, Paul felt his eyes grow wide.

"I'll be old by then," he said, mindlessly, his thoughts elsewhere.

This time, she slapped rather than patted his knee. "Oh, not so old."

"Sorry."

"I've got to go and prepare for our departure." Vanessa stood. "It'll be good to go home."

"Yes. It'll be great," said Paul, thinking not of his departure, but of his return. ■

Continued from "Liederkranz," p. 45

you, Jacob Saltzman, for disrupting the taxonomic array. The cognitive complexity of your linguistic systems was more involved than we had anticipated. We intended to utilize a host for only an hour, until we could establish alternate protocols for communication."

Jacob wiped his hands off on a napkin. "Good. Let's do that." He turned to the doctor. "Would you mind helping Ms. Saunders into her own clothes? We need to be going."

Dr. Wu nodded slowly, rising and stepping to a wardrobe. "So, I've been talking with an alien intelligence for the past few days?"

Jacob nodded. "Something like that. But I wouldn't worry too much about it, or bother to tell anyone. No one will believe a crazy story like that. The world's more comfortable trusting in defective weather satellites than crediting stories of alien probes."

The doctor carried an armful of clothes back to the bed where "Montassio"—aka Elizabeth Saunders, the vessel of an alien envoy—patiently awaited her. "What happens now?"

"Now?" said Jacob. "Now I take our friend here to Washington, to meet the President, which was the goal all along." He smiled. "After all, he's the big cheese, right?" ■

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THE ALTERNATE VIEW Jeffery D. Kooistra

ALLURE-FREE STRINGS

You know the expression "He couldn't see the forest for the trees," of course. I suffered from this recently. I'd submitted three chapters of a novel to my agent, and he came back with three paragraphs that said, essentially, "This is shit." He was right. Upon reflection, I realized that I'd been focusing so much upon what I wanted the characters to do that I'd failed to notice that they were acting like self-absorbed assholes. My agent's letter was the slap on the head I needed to see the obvious.

I think string theorists need a good slap on the head, too.

Now and then I like to read (Okay—*force* myself to read) a popular science book at the "forefront of knowledge"—one of those books written by a "leading physicist" and aimed at the educated and interested layman. I used to gobble such books down the same way I devour Harry Potter novels. I now find them much harder going because on almost every page I notice oversimplifications or misstatements of fact or faulty reasoning. If I review such a book, my own idiosyncratic complaints tend to obscure to my readers just how valuable the book might be for them to read. That is, though my bitch is with 2 percent of what's on the page, the other 98 percent is probably worthy material.

Recently I finished reading *The Fabric of the Cosmos* by string theorist Brian Greene. (Alfred A. Knopf, 2004. ISBN 0-375-41288-3) I'm not particularly interested in string theory, but it is out there as one of the best ideas yet to lead to a Theory of Everything. I figured I'd see what was in the book so that, at minimum, I'd be in a better position to justify why I ignore this stuff. To assist me with this column, I enlisted the help of an old friend to balance out my above-mentioned idiosyncrasies.

His name is Jeff Ballast and I've known him since kindergarten. Always a good student, he became senior class president, won the lead in the school play two years running, and became a professional musician. He played the trombone, but in his early thirties his "lip blew out," and his music career was over. Undaunted, he returned to school and is now a physician's assistant. Jeff is exactly that sort of educated layman that people like Greene hope to reach with their books—the intelligent nonscientist interested in science. Jeff has also read Greene, and last January we attended Greene's lecture on *Fabric* together at our *alma mater*.

This column is not a review of Greene's book but more of a screed about how string theorists fail to note the obvious. Still, a few words about the book are in order.

As expected, *Fabric* began to annoy right away. Right there on page x of the preface it says: "But during the last hundred years, discoveries in physics have suggested revisions to our everyday sense of reality that are as dramatic, as mind-bending, as paradigm-shaking as the most imaginative science fiction." No, they aren't. On page 486, it says:

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"That we've gotten as far as we have—that we've revealed numerous features of space and time vastly beyond common experience—attests to progress unfathomable a century ago." Nonsense. Much of what is cutting edge today was being "fathomed" a hundred years ago, which Greene would have known if he'd bothered to look.

I deliberately picked two quotes from widely separated parts of the book because the excessive length of this tome is another annoyance. With the index, it runs to 569 pages. Jeff and I agree it should be cut to maybe 300 or so. Perhaps Greene needs an editor to tell him to resist the constant urge to run to the hyperbole jar (see quotes above).

As most *Analog* readers know by now, quantum mechanics and general relativity (the theory of the very small and the theory of the very large, respectively) are incompatible with each other. All attempts to unify them have fallen short of the goal. Greene is convinced that string theory (or superstring theory) will eventually carry the day and lead to the unification that physicists seek.

How does it do this? Modern physics treats subatomic particles as mathematical points. Electrons, for instance, are indivisible and have no size and no internal structure. But "according to superstring theory, every particle is composed of a tiny filament of energy . . ." (p. 17) You can picture the superstring as a tiny, little rubber band, and its vibrational modes determine what kind of particle it is.

How does this help? With particles of zero size, this leads to mathematical problems equivalent to trying to divide a number by zero—that is, it leads to infinities. Superstrings, which have extent in one dimension, solve that problem. (You might think that simply insisting that elementary particles are small spheres of some size rather than of no size would do the same thing, but that also leads to problems.)

Greene explains how the mathematics of string theory is compatible with what we know empirically about the behavior of elementary particles, quantum mechanics, and gravity. The only hitch is that we have to assume that the universe has ten (or eleven) dimensions; otherwise the theory isn't mathematically consistent. Given that, we're essentially home free. On page 352 Greene says, "With the description I've given so far, it might seem baffling that any physicist would resist the allure of string theory."

I quoted Greene earlier saying strings are "filaments of energy." He also says: "The *mass* of a particle in string theory is nothing but the *energy* of its vibrating string. For instance, the explanation string theory offers for why one particle is heavier than another is that the string constituting the heavier particle is vibrating faster and more furiously than the string constituting the lighter particle. Faster and more furious vibration means higher energy, and higher energy translates, via Einstein's equation, into greater mass. Conversely, the lighter a particle is, the slower and less frenetic is the corresponding string vibration; a massless particle like a photon or a graviton corresponds to a string executing the most placid and gentle vibrational pattern that it possibly can." (Pg. 354. All italics in the original.)

Whew. How can I resist the allure?

But isn't a gamma ray photon both high energy and also massless like any other photon? That seems contradictory with the above, and Greene doesn't clear up this question. I also find it odd that a string is both *made up of* energy and yet also has vibrational energy that is, presumably, not quite string-like. To me this makes "energy" look even more fundamental than the strings, so shouldn't he be figuring out precisely what *energy* is?

If the point of string theory is just to unify QM with GR, maybe the theory can help us do this above the level of what the cosmological fabric really is. But the point of the book is supposed to

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be that the fabric of the cosmos is made of strings, yet Greene sometimes writes as if the fabric of the cosmos is actually "energy," and that's a tricky word to wrap an image around.

All the hand waving in the world won't help.

Cutting to the chase, my big problem with string theory is that I don't see the point in starting with an obviously *non-physical* object and building a theory around it. Subatomic particles, treated as points (and few working physicists think they really *are* points) and thus not having any extent, can't be things. But a string isn't any better. It has length, but no width. So when it's vibrating, what, pray tell, is this width-free stuff that's moving?

Why not simply start with an extended three-dimensional object in the first place? For all the reasons put forth by Greene, we obviously do need an extended object. And the idea that the properties of said object derive from the vibrational (or more generally, motional) modes is a good one—particles must be dynamic entities. Since to even obtain mathematical consistency, string theory requires ten (or eleven) dimensions, why not accept this as evidence that string theory is wrong, and go about building our theory around 3-d objects that might fill the bill in our 3-d universe?

The only objection I can see is that once you start talking about 3-d objects in a real universe, you can't avoid asking what they're made of. And you're not going to be able to get away with a flip answer like "energy."

This leads us inexorably back to the aether, an idea that I've discussed previously in both my March 2000 and my February 2001 columns.

Greene deals with the aether a bit himself, mostly in the usual modern-day dismissive way (although he thinks the theorized Higgs field might be akin to it). He believes wrongly, as most physicists do, that the Michelson-Morley experiment failed to find the aether, and that Einstein proved there wasn't one. But Greene accepts those extra dimensions only because they're needed to make string theory consistent with itself. He says, "... physicists showed that these extra dimensions have the capacity to bridge the gap between string theory's vibrational patterns and the elementary particles experimenters have discovered." (pp. 359-360) (My friend Jeff doesn't have a problem with adding in extra dimensions to a *mathematical* theory. It did, after all, work for geocentrism whenever an additional epicycle was needed to get the model to match observation.)

I say, instead of invoking extra *dimensions*, why not accept the obvious truth that there is something rather than nothing, and invoke a three-dimensional mathematically perfect fluid, which is by definition self-consistent? Since string-like forms are useful, we can ask ourselves if such string-like things exist in perfect fluids. The answer is yes—line vortices. Can these line vortices do all the things that strings do, like vibrate? Yes, they can. Can they form solitonic (particle-like) structures? Think smoke rings.

We already know that one vortex will attract another depending on their respective rotational directions—reverse the spin on one, and they'll repel each other. So we can directly associate vortical properties with particle properties—in this case, charge. We know that fluid dynamics are compatible with electrodynamics since the latter came out of the former. The same holds true for General Relativity.

Even Greene acknowledges (on pages 345, 474, 488, and 490) that strings may indeed be made of "finer stuff" (his claim that they're made out of energy notwithstanding).

Indeed, how can any physicist resist the allure of aether theory?

A clue can be found on page 486, at least for physicists like Greene. There he

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says, ". . . serious thought regarding (spacetime's) microscopic makeup required the twentieth-century discoveries of general relativity and quantum mechanics. . . . That we've gotten as far as we have—that we've revealed numerous features of space and time vastly beyond common experience—attests to progress unfathomable a century ago." To them, the aether is an old idea, long discredited, as relevant today as gaslights and horse drawn carriages. It seems never to have crossed his mind that most of the physicists responsible for both QM and GR never dismissed the aether as easily as he and his fellows do.

They knew better.

Maybe it's just a matter of personal taste, but it seems to me that if the path to the future of physics requires six or seven extra dimensions to get there, maybe we'd better first make sure we didn't take a wrong turn somewhere.

Even an ordinary educated layman like my friend Jeff understands that. ■

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The Best-Laid Plans

Jerry Oltion

Shortsightedness builds its own monuments. . . .

Dave Wilson was tending his Mars boxes in the Destiny Module when word came up from Mission Control that the space station was to be shut down. Mike Mortimer took the call in the Zvezda Module, on the other side of the docking collar and the Zarya Module, and Dave could still hear him shout, "We won't go! We'll stay here until we run out of air! Longer! You can send a shuttle to pick up our desiccated corpses!"

Speak for yourself, Dave thought, but he would have said the same thing in Mike's place. Anything to defy the bean-counters on the ground, anything to disrupt their bottom-line-driven timetable and buy the mission just a little more time. Not that it would matter in the grand scheme of things—there would never be enough money to actually finish the Mars program even if NASA kept the space station running for another decade—but he and Mike were so close to solving the life-support problem that Dave could almost imagine sacrificing his life to finish the research.

Almost, but not quite. Genetically engineering plants that could grow on Mars was an important project, and if he thought his work would ever actually wind up providing food and oxygen for Martian explorers, he would gladly stay here until his last gasp, but the way public opinion was shifting away from space exploration, it was clear that nobody would be going to Mars within his lifetime, or for several generations to come.

Mike flew feet-first into the Unity Node, arrested himself with a savage kick to the bulkhead, and ping-ponged into the Destiny Module. "The bastards are giving us ten days," he said.

"Ten *days*?" Dave echoed. "We can't mothball the entire station in ten days."

"They don't want it mothballed. Once we're gone, they're going to Skylab it."

Dave looked down the length of the

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Destiny Module, a fifteen-foot-wide, thirty-foot-long cylinder festooned with instrumentation. Centrifuges, mass spectrometers, incubators, microscopes, heat pumps—literally tons of equipment, all brought into orbit at a cost of thousands of dollars a pound, and NASA wanted to let it burn up on re-entry.

Along with his seed stock. No way would they let him bring that back, not after the modified wheat fiasco in Montana. Never mind that the hybrid plants had died after the second generation, just as they had been designed to do; the public hysteria over "runaway genes" had killed any hope of bringing to Earth genetically engineered plants designed to grow on Mars.

Still . . . "They know how close we are," Dave said. "How can they pull the plug *now*?"

Mike rolled his eyes. "Why do you think they're *doing* it now? Because somebody's afraid of what we're creating up here."

Dave looked at the Mars box in front of him. Thick frost rimed the metal frame, and the glass was ripply with ice crystals, but behind it grew a two-foot-square plot of surprisingly healthy-looking wheat. "What's it going to do, take over Antarctica? The most terraphilic variant we've got won't grow in temperatures above freezing even if it *did* get away from us."

Mike steadied himself against the lab's open hatch. "We know that, and just about everybody else with a brain knows that, too, but Congress controls our budget and you know who controls Congress."

"So what are we going to do?"

"Stay up here until we run out of air," Mike said. "And see if we can finish the job we came here to do before that happens."

"Just so we can watch it burn up when they drop this place into the atmosphere? What's the point?"

Mike fixed him with a hard stare. "How long do you think it would take people to get to Mars if it was green?"

"What do you mean?"

"I mean nobody wants to pay for a mission to a dead rock. That's when the funding started to dry up; when the remote probes kept turning up no evidence of life. Well, we've got seeds that would grow there. They're supposed to provide food for astronauts, but what if we just scatter them planetwide instead? Wheat fields on the Elysium plain. Corn growing wild on the slopes of Olympus. How long do you think it would take people to mount a mission then?"

Dave snorted. "How long do you think it would take the plants to spread? Assuming they grow there in the first place. The open planet is a lot different from a Mars box on a space station."

Mike said, "You've spent the last five years claiming it wasn't. Were you lying?"

That punched one of Dave's hot buttons. "Of course not! The environment in these incubators is as close to Mars as we can get. It's just—"

"Then have some faith in your work. You built the plants for Mars; they'll grow there."

"Maybe so."

Mike glared at him.

"Okay, they will. But how are we going to get them there? Nobody would fund a mission all the way to Mars just to scatter some seeds around."

"Nobody has to. We've got two re-entry vehicles."

Dave felt a chill run down his spine, and it wasn't from proximity to the Mars boxes. "Re-entry vehicles? You can't be serious. They wouldn't take us to the Moon, much less Mars. We don't have the consumables even if they could, and we don't have anything *like* the space we'd need to keep a greenhouse going to grow 'em on the way."

"They don't have to take *us* anywhere. At least one of them doesn't. We'll go home in one when our work is

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done up here, but the other one can carry seeds. I can rip out the life support and the seats to lighten it up, and we can put it on a minimum-energy escape trajectory. It might take a few years, but it'll get there."

"And burn up on entry when it does. It's designed to land on *Earth*, not Mars."

Mike shook his head. "So we rig an inner capsule that survives the fall. Or we blow the seeds out in separate heat-shielded mini-containers before they get there. I don't know; I'll think of something. You just harvest the seeds. Let me worry about the delivery system."

Dave looked at his Mars wheat. It was growing fine inside the cold box. The heads were already swelling with seed, and these didn't have a second-generation death gene, either. It would take a couple more weeks for them to mature, but he and Mike had that much time, easy. They could stay on board for months if they were careful with their consumables. Long enough to harvest the corn, potatoes, beans, and lettuce, too. And the soil bacteria that went along with them, of course. He might even have time to run those through a few more generations of speciation to improve the likelihood that one or another strain would survive.

Mission Control would have a cow, of course. Dave and Mike would never fly again. But if NASA was killing the space station, what were the odds of another flight anyway? If they were destined to be the last astronauts of their generation, they might as well spend their final days on the job in one last-ditch effort to make the next generation's job a little easier.

"All right," he said to Mike. "Let's do it."

Dave and Mike never knew if their ark made it. They stayed an extra three months on board the space station, time bought with oxygen generated by the very plants they were struggling to save, but they didn't let on to anyone what they were doing all that time. The media made it out to be a protest against the closure of the manned space program, which was true, and that generated enough of an upswell of public support for them that it looked for a while as if they might accomplish their goal before the seeds even made it to Mars, but then somebody blew up an embassy in South America and public attention turned to the inevitable war. By the time Dave and Mike fired up their remaining re-entry vehicle and came home, they were old news.

After the inevitable lawsuits, Dave went into the private sector and used what he had learned on the Mars project to build disease-resistant crops for recovering nations, while Mike went into propulsion design, trying to develop an efficient rocket to get people to Mars when they finally decided they wanted to go. He never got to the hardware stage, but he published three volumes of notes, many of which the military used to develop new weapons systems.

Both men had families, and both told their children what they had done, making them promise to tell their children and exact the same promise from them, so the story would propagate through the generations just as the life that they had sent to Mars was presumably propagating across the barren red landscape.

When the first patches of green started showing up in telescopes, decades after Dave and Mike had died, there was a brief resurgence of interest in a Mars mission, but the global warming crisis was in full swing by then, and every available dollar had to go into relocating shoreline cities to higher ground.

A hundred years after that, when a good quarter of Mars's southern hemisphere was green, one of Dave's descendants cashed in the family fortune and used it for startup money, but she couldn't get enough investors to fund a manned expedition. They sent a probe

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(using Mike's engine design), and confirmed that the green patches were indeed a wild mix of Earth food crops, but there was no way to harvest them economically and the atmosphere was still mostly carbon dioxide and too thin to support a colony, so it seemed a moot point. There was nothing on Mars that Earth needed, and there was always a better use for the money at home.

Another two hundred years passed. By then Mars was green from pole to pole, but nobody cared. The Australian Troubles occupied the world's attention, and most of its finances.

Every hundred years or so, another of Dave's or Mike's descendants would try to spur the world's governments into finishing what their forebears had started, but there were always wars to be fought and environmental crises to throw money at. Plus, people who wanted to explore new worlds could do so at any time by merely plugging in to one of the myriad designer universes available in virtual space, all from the comfort of their own cubicles. Even when Mars's atmospheric oxygen content built up to a breathable level and people could live on the surface, nobody wanted to spend the money to start a colony there.

Then the aliens showed up. Dafe Weilshon, great-to-the-forty-fifth grandson of the man who started it all, was sixteen years old at the time, and had just been drafted to fight in the Canadian Secession War when astronomers saw the drive flame of a starship decelerating into orbit around Mars. They sent radio messages to the aliens, saying essentially, "Hey, we're over here," and the aliens replied, "Oh, Hi. We'll come on over for a visit after we've gotten settled in," to which humanity predictably replied, "You can't live there! That's ours!" "Doesn't look like it to us," the aliens said. "If it was, there'd be people here." And they sent down landing craft and started building cities.

That did what no amount of scientific arguments or invocations of manifest destiny could accomplish. Within a year, the Joint International Network for Guaranteeing Ownership (including Canada) had assembled an entire fleet of manned spacecraft, all armed to the teeth, and launched them for Mars.

Dafe was on board one of the ships. Not the lead ship, fortunately; that disappeared in a fog of metal vapor seconds after it fired on the alien starship, but its nuclear warheads continued on, and the next half dozen Earth ships added theirs to the barrage until the alien ship blossomed into a pretty cloud of its own.

The colony sites below put up a surprisingly strong fight, considering their position at the bottom of a gravity well, but they were light-years from resupply, and Earth for once piled all its resources into the Mars mission. Mushroom clouds rose like flowers from the surface of the once-red planet, spreading their deadly pollen far and wide. What the bombs didn't incinerate, their fallout irradiated, and the wildfires that swept through the dry husks of vegetation poured gigatons of carbon dioxide back into the atmosphere, returning it to its primordial state.

Dafe actually set foot on Mars, fulfilling his family's millennium-old dream. He and the rest of his regiment, wearing spacesuits to protect them from the poisonous atmosphere, searched high and low for alien survivors, but found none. They found plenty of artifacts, which they duly collected and hauled back to their transport ships, and eventually to Earth for scientists to study and mine for new technology.

Dafe married one of his platoonmates, and they had children, whom they told about their adventures on Mars. "One day maybe you can go there, too," they said to their kids. "When the biosphere recovers and people can live there again."

But the biosphere didn't recover. Humanity didn't try to fix it, either. They

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kept the fleet ready for a few years in case the aliens sent another ship, but eventually the maintenance costs grew too great, so they mothballed it. Astronomers watched dust storms sweep across the surface of Mars, erasing all signs of human and alien presence until even the blast craters had blended in with the impact craters that had always peppered the landscape.

Dafe's descendants would occasionally lobby for another mission to Mars, but the governments they approached were always busy fighting a war or planning the next one, and when the would-be astronauts took their message to the public the response was always, "Been there, done that."

Mars moved on in its orbit. Earth moved on in its. Eventually a comet smacked into the Pacific Ocean and wiped the slate clean.

Cockroaches survived. Their descendants didn't much care about Mars either. ■

IN TIMES TO COME

Our October issue offers a wide variety of stories large and small, including new entries about Stephen Baxter's wildly exotic and truly multilayered "Old Earth" and Amy Bechtel's amiable sea monsters (and the veterinarian who cares for them). Stephen L. Burns kicks off his season with a neat bit of satire, while Catherine Shaffer and Dave Creek explore two very different kinds of human-alien interaction. We even have a small but tasty tidbit by that well-known alternate historian, Harry Turtledove.

Richard A. Lovett appears in two capacities, with a fictional something for the season and a very nonfictional article about "The Wired Ocean: Doing Oceanography Without Getting All Wet." Current technology (no pun intended, he lied) provides quite a few ways to do frontier research in relative comfort—and sometimes better than if the researcher were "on the spot."

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Paradox & Greenblatt, Attorneys at Law

Kevin J. Anderson

Any new technology opens up new opportunities for one of the oldest professions.

You might say our little firm specializes in contradictions. In a few years, Aaron Greenblatt and I are sure to be millionaire visionaries overloaded with cases, but right now our field of law is still in its infancy. We've carved out a new niche, and people are already starting to find us.

Since we can't afford a receptionist (not yet), Aaron took the call. But because he was up to his nostrils in a corporate lawsuit—a client suing Time Travel Expeditions for refusing to let him go to the late Cretaceous on a dinosaur hunt—he passed the case to me.

"Line One for you, Marty," he said as I came out of the lav, wiping my hands. "New case on the hook. Simple attempted murder, I think. Guy sounds frantic."

"They all sound frantic." I pursed my lips. "Is time travel involved?"

He nodded, and I knew there would be nothing "simple" about the case. Fortunately, temporal complications are right up our firm's alley. We're forward-thinkers, my partner and I—*and* backward-thinkers, when it's effective. That's why people call us when nobody else knows what the hell to do.

I picked up the phone and punched the solitary blinking light. "Marty Paramus here. How can I help you?"

The man talked a mile a minute in a thin, squeaky voice; even if he hadn't been panicked, it probably would have sounded unpleasant. "All I did was try to stop him from buying her some deep-fried artichoke hearts. How could that be construed as attempted murder? They can't pin anything on me, can they? Why would they think I was trying

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to kill anybody?"

"Maybe you'd better tell me, Mr. . . . uh?"

"Hendergast. Lionel Hendergast. And I read the terms of the contract very carefully before we went back in time. It didn't say anything about deep-fried artichoke hearts."

I sighed. "What was your location, Mr. Hendergast?"

"Santa Cruz Boardwalk. The place with all the rides and the arcade games. They have concession stands and—"

"Sure, but *when* was this?"

"Umm, two days ago."

I hate having to pry all the obvious information out of a client. "Not in your time. I mean in *real* time."

"Oh, um, fifty-two years ago."

"Ah." I made a noise that hinted at a deeper understanding than I really had, yet. "One of those nostalgic life-was-better-back-then tours."

Now he sounded defensive. "Nothing illegal about them, Mr. Paramus. They're perfectly legitimate."

"So you said. But someone must think you broke the rules, or you wouldn't have been arrested. Was this person allergic to artichoke hearts or something?"

"No, not at all. And it wasn't the artichoke hearts. I was just trying to prevent him from buying them for *her*. I didn't want the two of them to meet."

A light bulb winked on inside my head. "Oh, one of those."

"Altering history" cases were my bread and butter.

The jail's attorney-client meeting room wasn't much better than a cell. The cinderblock walls were covered with a hardened slime of seafoam-green paint. The chairs around the table creaked, and veritable stalactites of petrified chewing gum adorned the table's underside. Since prisoners weren't allowed to chew gum, their lawyers must have been responsible for this mess. Some attorneys give the whole field a bad name.

Lionel Hendergast was in his mid-twenties, but looked at least a decade older than that. His too-round face, set atop a long and skinny neck, reminded me of a smiling jack-o-lantern balanced on a stalk. His long-fingered hands fidgeted. He looked toward me as if I were a superhero swooping in to the rescue.

"I need to understand exactly what you've done, Mr. Hendergast. Tell me the truth, and don't hold back anything. No bullshit. We have attorney-client privilege here, and I need to know what I'm working with."

"I'm innocent."

I rolled my eyes. "Listen, Mr. Hendergast—Lionel—my job is to get you off the hook for the crime of which you're accused. Let's save the declarations of innocence for the judge, okay? Now, start from the beginning."

He swallowed, took a deep breath, then said, "I took a trip back in time to the Santa Cruz Beach Boardwalk in 1973, as I said. You can get the brochure from the time-travel company I used. There's nothing wrong with it, absolutely not."

"And why did you want to go to Santa Cruz?"

He shrugged unconvincingly. "The old carousel, the carnival rides, the games where you throw a ball and knock down bottles. And then there's the beach, cotton candy, churros, hot dogs, giant pretzels."

"And artichoke hearts," I prodded.

Lionel swiveled nervously in his chair, which made a protesting creak. "Deep-fried artichoke hearts are sort of a specialty there. A woman nearing the front of the line had dropped her wallet on the ground not ten feet away, but she didn't know it yet. In a few minutes, she was going to order deep-fried artichoke hearts—and when she discovered she had no money to pay, the man behind her in line would step up like a knight in shining armor, pay for her artichoke hearts, and help her search for her wal-

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let. They'd find it, and then go out to dinner. The rest is history."

"And you seem to know the details of this history quite well. What exactly were you going to do?"

"Well, I found the woman's wallet, on purpose, so I could give it back to her. Nothing illegal in that, is there?"

I nodded, already frowning. "Thereby preventing the man behind her from doing a good deed, stopping them from going to dinner, and"—I held my hands out—"accomplishing what?"

"If they didn't meet, then they wouldn't get married. And if they didn't get married, then they wouldn't have a son who is the true spawn of all evil."

"The Damien defense doesn't hold up in court, you know. I can cite several precedents."

"But if I had succeeded, who would have known? There would've been no crime because nothing would have happened. How can they accuse me of anything?"

"Because recorded history is admissible in a court of law," I said. "So by attempting to keep these two people from meeting, you were effectively trying to commit a murder by preventing someone from being born."

"If, if, if!" Hendergast looked much more agitated now. "But I didn't do it, so how can they hold me?"

The legal system has never been good at adapting to rapid change. Law tends to be reactive instead of proactive. When new technology changes the face of the world, the last people to deal with it—right behind senior citizens and vested union workers—are judges and the law. Remember copyright suits in the early days of the internet, when the uses and abuses of intellectual property zoomed ahead of the lawmakers like an Indy 500 racecar passing an Amish horse cart?

Now, in an era of time-travel tourism, with the often-contradictory restrictions the companies impose upon themselves, legal problems have been springing up like wildflowers in a manure field. Aaron Greenblatt and I formed our partnership to go after these cases. We are, in effect, creating major precedents with every case we take, win or lose.

Where was a person like Lionel Hendergast to turn? Everyone is entitled to legal representation. He didn't entirely understand the charges against him, and I was fairly certain that the judge wouldn't know what to do either. Judges dislike being forced to make up their minds from scratch, instead of finding a sufficiently similar case from which they can copy what their predecessors have done.

"Do you ever sit back and play the 'what if?' game, Mr. Paramus?" Lionel asked, startling me. "If a certain event had changed, how would your life be different? If your parents hadn't gotten divorced, your dad might not have killed himself, your mom might not have married some abusive truck driver and moved off to Nevada where she won't return your calls or even give you her correct street address? That sort of thing?"

I looked at him. Now we might finally be getting somewhere. "I've seen *It's a Wonderful Life*. Four times, in fact, including the alternate-ending version. I'm very familiar with 'What if.' Who were you trying to kill and what was the result you hoped to achieve?"

"I wasn't trying to ***kill*** anyone," he insisted.

From the frightened little-boy expression on Lionel's round face, I could see he wasn't a violent man. He could never have taken a gun to someone or cut the brake cables on his victim's car. He wouldn't even have had the stomach to pay a professional hit man. No, he had wanted to achieve his goal in a way that would let him sleep at night.

"The man was Delano R. Franklin," he said. "You won't find a more vile and despicable man on the face of this Earth."

I didn't want to argue with my client, though I could have pointed out some

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pretty likely candidates for the vile-and-despicable championship. "Much as it may pain me to say this, Lionel, being unpleasant isn't against the law."

"My parents were happily married, a long time ago. My dad had a good job. He owned a furniture store. And my mom was a receptionist in a car dealership—a dealership owned by Mr. Franklin. We had a nice home in the suburbs. I was supposed to get a puppy that Christmas."

"How old were you?"

"Four."

"And you remember all these details?"

He wouldn't look at me. "Not really, but I've heard about it a thousand times. My parents couldn't stop arguing about that day my dad took time off in the afternoon. He decided to surprise my mother over at the car dealership by bringing her a dozen long-stemmed roses."

"How romantic," I said.

"At the car dealership they take a late lunch hour, so they can handle the customer rush between noon and one. When my dad couldn't find anyone at the reception counter, he went to the back room and opened the door—only to find my mom flat on the desk with her skirt hiked up to her hips, legs wrapped around Franklin's neck, and him pumping away into her."

It wasn't the first time I had heard this sort of story. "I can see how that would ruin a marriage."

"My dad went nuts. He tried to attack Franklin and as a result, ended up in jail with charges of assault. Franklin had most of our local officials in his pocket—small town. At first my mom insisted that Franklin threatened to fire her if she didn't have sex with him. In the resulting scandal, she changed her story, saying that the affair had gone on for a while, that Franklin wanted to marry her. My parents split up, but as soon as the divorce was final, the creep wanted nothing to do with her. He kicked my mom out. She had no job, and by that time my dad had lost his furniture store."

"Sounds like a mess. So what happened to little Lionel?"

"We lived in Seaside, California—that's not far from Santa Cruz and Monterey. My dad got drunk one day and drove too fast along Highway 1."

I'd been there. "Some spectacular cliffs and tight curves on that stretch of highway."

Miserably, Lionel nodded. "The road curved, and my dad went straight. Suicide was suspected, but nobody ever proved it. Then, one day my mom just packed up, dropped me off at foster care, and left. Said she hated me because I was just like my father. I lived in six different homes until I was sixteen and old enough to emancipate myself."

I tried to sound sympathetic. "Not a very happy childhood."

"Meanwhile, Delano R. Franklin did quite well with his car dealership. In fact, he opened three more. He married some bimbo, divorced her when she got wrinkles, then married another one. Never had kids, but I think his wives were young enough to be his daughters."

I wanted to cut the rant short. "All right, but what does this have to do with deep-fried artichoke hearts?"

Tears started running down his cheeks. "I remembered my mother yelling at Franklin once. He had wooed her by telling romantic stories, describing how his own parents met. The man who would be Franklin's father came to the rescue, helped find a lady's wallet at the artichoke stand, took her out to eat . . . and eventually spawned this inkblot on the human race, a uniting of sperm and egg that any compassionate God would have prevented!"

I paced around the table, locking my hands behind my back. "So you figured that if you kept Franklin's biological mother and father from meeting, he would never have been born, your parents' marriage would have remained

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happy, and your life would have been wonderful."

"That's about it, Mr. Paramus. But Franklin had someone watching me, so I got caught."

"Watching you? How could he possibly have suspected such an absurd thing?"

"Because I, uh . . ." Lionel blushed. "I told him. I couldn't help myself. I wanted the scumbag to know he was about to be removed from existence."

I groaned. In this business, the only thing worse than a hardened criminal is an unconscionably stupid client.

"You have to get me out of here, Mr. Paramus!" Given the circumstances, an unreasonable demand. "That holding cell is a nightmare. It smells. There's no privacy even for the toilet, and they took blood samples to test me for HIV and other diseases. They drew my blood! That means other people in the cell must have those terrible diseases. What if I—"

"It's just standard procedure, Lionel." I snapped my briefcase shut. "Let me work on this and see what I can come up with. I'll try to get you bail. I'll talk to Mr. Franklin and his attorney on the off chance I can get them to drop the charges."

It was certainly a long shot, but I wanted to give poor Lionel something to cling to.

I set up a meeting in the "boardroom" of the dumpy offices Aaron and I shared. I doubted I could impress Delano Franklin, but maybe I could convince him it wasn't worth the trouble to press charges. Lionel Hendergast had almost no money, and when I learned who Franklin had hired for his own counsel to go after civil damages, I knew that money—or at least showmanship—would be a primary factor in this case.

If you look in the dictionary next to the definition of the word "shyster," you'll find a picture of Kosimo Arkulian. He was overweight, with thinning steel-gray hair in a greasy comb-over that fooled nobody. He wore too many rings, too many gold chains and a too-large gold watch, and he spoke too loudly. You've seen Arkulian on television with his boisterous ads, flashing his jewelry and his smile, treating everyone with a hangnail of a complaint as the next big millionaire in the lawsuit sweepstakes.

When Arkulian sat down beside his client, I could tell it was going to be a testosterone war between those two men. Both were accustomed to being in charge.

I gave my most pleasant smile. "Can I offer you coffee or a soda?"

"No, thank you," Franklin said.

"This isn't a social call," Arkulian answered in a brusque tone.

"There's always time for good manners." I looked at the clock on the wall. It was 1:00. "How about Scotch, then?" I had to get Franklin to take something. "Or a bourbon? I have a very good bourbon—Booker's." From my research, I knew Franklin was quite fond of both.

"If your bourbon's expensive, I'll have one of those," he said.

Arkulian shot him a glance. "I wouldn't advise it—"

"I'm not going to get sloshed," Franklin said. "Besides, I see a genuine irony in soaking this guy for a good expensive drink."

Arkulian grinned. "Then I'll have one, too."

I had been careful to wash everything in our kitchenette before the meeting started. I quickly poured three glasses of fine bourbon, neat, and handed one to Franklin and one to Arkulian. The third I placed in front of me in a comradely gesture, though I barely sipped from it. I had a feeling I'd need to keep my wits sharp.

Franklin looked like a distinguished late-middle-aged businessman gone bad. If groomed well, he could have fit comfortably into any high-society function, but he had let himself grow a beer gut. His clothes were garish, something he

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no doubt thought younger women found attractive. The ladies probably laughed at him until they found out how much money he had; then they played along, but still laughed at him behind his back.

I tried my best gambit, pumping up the sob story, practicing how it would sound before a jury, although it was unlikely this case would ever go to trial. The law was too uncertain, the convolutions and intangibilities of time paradox too difficult for the average person to grasp.

"None of this has any bearing on what your client tried to do to my client," Arkulian said. "Sure, the poor kid had a troubled life. His mother had an affair with my client some twenty-six years ago, which led to the breakup of his parents' marriage. Boo-hoo. As if that story doesn't reflect half of the American public."

Maybe your half, I thought, but kept a tight smile on my face.

"Mr. Hendergast attempted to murder my client. It's as simple as—"

Impatient with letting his lawyer do all the talking, Franklin interrupted. "Wait a minute. This is far worse than just attempted murder." As if he needed the fortification of liquid courage to face what had almost happened, Franklin grabbed his tumbler of bourbon, and took a long drink. He set the glass down, and I could see the smear his lips had made on the edge. "If Lionel Hendergast had gunned me down in the parking lot of one of my car dealerships, he might have killed me, yes, but my legacy would have been left behind—my car dealerships, my friends. . ."

"Your ex-wives," I pointed out.

"Some of them remember me fondly." He didn't even blush.

Arkulian picked up the story. "You see, what Mr. Hendergast was attempting to do would have erased my client entirely from existence. He would have obliterated the man named Delano R. Franklin from the universe, leaving no memory of him. Nothing he ever accomplished in this life would have remained. Complete annihilation. An unspeakably heinous crime! And if Mr. Hendergast had succeeded, it would have been the perfect crime, too. No one would ever have known what he did, since there would have been no evidence, no body, no victim."

I had heard my share of "perfect crime" stories, and I had to admit, this ranked right up there with the best. I didn't offer them another drink. "What exactly is it you want from my client?"

"I want him to go to jail," Franklin said. "I want him to be locked up so that I don't have to worry every morning that he's going to sneak back on another time-travel expedition and try again to erase my existence."

Arkulian smiled and folded his fingers. I couldn't imagine how he could fit them together with all those rings on his knuckles. "I'm guessing the publicity on this case will give a remarkable boost to my business—and don't expect me to believe you haven't thought of the same thing, Mr. Paramus."

He was right, of course. I shrugged. "Publicity is free, after all, and TV ads are a bit out of my price range." Ambulance-chasing seemed to be paying off quite well for Arkulian. I couldn't resist taking a small jab at him. "How much *do* ten of those rings cost?"

Miffed, Arkulian stood up. "If there's nothing else, Paramus? We'll see you in court."

I let the two men show themselves out, staying behind in the boardroom. When they were gone, I took a clean handkerchief, carefully lifted the near-empty bourbon glass Franklin had used, and made sure there were sufficient saliva traces on the rim. This was all I'd need.

Predictably, a media frenzy surrounded the case. Arkulian held a large press conference in which he grandstanded, accusing me of leaking the story in or-

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der to get publicity. Within an hour, I had a press conference of my own, accusing him of the same. Both of us received plenty of coverage, and neither of us ever admitted to making a few discreet phone calls and tipping reporters off.

Lionel put his complete trust in me, which always sparks that uncomfortable paternal feeling. But I hadn't been kidding when I told him the law is still murky in these sorts of cases. Nobody had any idea which way it would go, and even my "ace in the hole" was a long shot. I still hadn't got the lab results back.

For the preliminary hearing, we were assigned an ancient female judge, the Honorable Bernadette Maddox. I was uneasy about her age: In my experience, elderly judges don't deal well with the second- and third-order implications of rapidly changing technologies. I'd rather have had the youngest, most computer-savvy person on the bench.

I still held out some hope that Bernadette Maddox was a sweet old lady, and the sob-story aspect would work on her. Not a chance.

"Mr. Arkulian!" she roared from the bench in a battleaxe voice before he had even finished his pompous remark. "You will sit down, shut up, and let me run this show." I looked over at my rival with a twinge of sympathy. So much for the nice old lady bit. "And you will remove that disgusting cheap jewelry in my courtroom unless you have an appointment with Time-Travel Expeditions to go back to the days of disco."

"Your Honor, my personal appearance has no bearing on—"

"You will remove the jewelry because it hurts my eyes. I can't even see your client through the glare from all those rings."

Cowed, Arkulian left the room. A nervous Lionel sat at the bench next to me, whispering, "Was that a good sign?"

"It wasn't so much a sign—more like a demonstration. The judge is only showing him who's boss. And let me warn you ahead of time, she's going to feel she needs to even the score and scold me as well at some point. Expect it and try not to get too upset."

"What are we going to do, Mr. Paramus?" He sounded so miserable. I felt sorry for this kid who had lost his parents, his Norman Rockwell childhood, and a lifetime of happiness, all because of Delano R. Franklin.

I had dug into Franklin's background, perhaps even more than Lionel had. There was no question in my mind that the world would be a better place if Franklin had never been born. He had left a decades-long trail of ex-wives and shady business dealings behind him. His primary legacy was a handful of auto dealerships, but since he had no heirs and couldn't keep employees around long enough to put them in positions of authority and responsibility, no one would take over the car lots upon his death, and they'd probably be liquidated. Even without Lionel's time-travel help, Franklin would vanish.

Since we were the defendants, we sat back and listened as a now-unadorned Arkulian outlined the civil part of the case, explaining time-travel paradoxes in painstaking detail, using examples culled not from any law library, but from classic science fiction stories. He was long-winded and explained too much to the judge, treating her as if she were incapable of grasping the classic grandfather paradox.

I kept checking my watch as I mentally rehearsed my opening statement. The courier should have been here by now. I would have preferred hard facts to fast talking, but I could proceed either way. As Arkulian rambled on and on, even Franklin looked bored.

Finally it was my turn. I hoped the judge would stall just to give me a few more minutes, but she puckered her wrinkled lips and leaned over like a hawk from the bench. "Now then, Mr. Paramus, let's hear what you have to say.

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I trust you can be more succinct—or at least more interesting—than Mr. Arkulian."

I stood up and cleared my throat. Still no sign of my delivery person, and I really wanted to know which direction to go. Either my ace in the hole was a high trump or a discard. With a sigh, I reached into my briefcase and pulled out a carefully prepared document. "Your Honor, I wish I did not have to do this, but would it be possible to request a brief continuance? I have not yet received an important piece of evidence that has a strong bearing on this case."

Lionel looked over at me, surprised. "What evidence?"

"A continuance?" the judge said with a snort. "I've been sitting here all morning, Mr. Paramus! You could have said this at the very beginning. How long are you asking for?" I was about to get my scolding, and Judge Maddox was clearly primed to let loose with even more venom than she had inflicted on Arkulian.

Suddenly the large doors were flung open at the back of the courtroom. The bailiff tried to stop a man from entering, but my partner Aaron Greenblatt sidestepped him. He marched in, waving a document in his left hand. "Excuse me, your Honor. Please pardon the interruption."

I stifled a laugh. It was a real Perry Mason moment. I suspected Aaron had always wanted to do that.

My partner's face was stoic; I hated the way he covered his emotions. He could have at least grinned or frowned to give me an inkling of what he held in his hands.

Judge Maddox lifted her gavel, looking more inclined to hit Aaron in the head with it than to rap her bench.

I blurted, "Your Honor, I withdraw my request for a continuance—so long as my associate can hand me that paper." I turned, not waiting for her answer as Aaron handed the lab results to me. He finally broke into a grin as I scanned the numbers and the comparison charts.

With a huge sigh of relief, I turned back to the bench. "Your Honor, in light of recent developments, I request that the attempted murder charges against my client be dropped."

Arkulian growled, "What are you playing at, Paramus?"

"I'll ask the questions here, Mr. Arkulian," the judge said, rapping her gavel for good measure. "Well, then—what are you playing at, Mr. Paramus?"

Bernadette Maddox already knew the sordid Peyton Place story of the ruined marriage, the broken family, the miserable life Lionel Hendergast had lived because of Franklin's actions.

"Your Honor, the prosecution's client was not entirely forthcoming about how long his affair with my client's mother lasted. If I might recap: when Lionel Hendergast was four years old, his father discovered Mr. Franklin and my client's mother *in flagrante delecto*, which triggered the chain of events leading to the crime of which my client is accused."

"And?" Judge Maddox said, drawing out the word.

"In fact, the affair had gone on for at least five years previous." I fluttered the sheet of lab data. "I have here the results of DNA tests comparing the blood sample my client gave to the county jail with samples I obtained from Mr. Franklin."

I smiled sweetly at them. Franklin appeared confused. Arkulian was outraged, realizing I had probably tested the saliva left behind on his drinking glass—an old trick.

"These results prove conclusively that the father of Lionel Hendergast is not the man he always believed, but rather Mr. Delano R. Franklin."

Lionel's eyes fairly popped out of their sockets. The judge sat up, suddenly much more interested. Both Arkulian and Franklin bellowed angrily as if in competition with each other until finally Arkulian stood up in a huff, reacting in the way he had seen too many lawyers react on TV shows. "I object!

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This has no bearing—"

"This has total bearing," I said.

Lionel looked as if he might faint, slide off the chair, and land on the courtroom floor. I put a steadying hand on his shoulder. He looked over at the prosecutor's table, and his two words came out in a squeak. "My father?"

I forged ahead. "The prosecution has interpreted this crime entirely wrong, your Honor. My client is accused of going back in time with the intent of preventing Mr. Franklin from ever being born. But if he had done that, then Lionel Hendergast would've erased ***himself*** from existence as well. He would have wiped out his own father, thereby ensuring that he himself could never be born."

I smiled. The judge seemed to be considering my line of reasoning. After all, Arkulian had prepped her in excruciating detail about grandfather paradoxes and the like.

"Therefore, instead of attempted murder, my client is guilty, at best, of attempted *suicide*—for which I recommend he be remanded for therapy and treatment, not incarceration."

"This is preposterous!" Arkulian yelled. "Even if Mr. Hendergast ***had*** accidentally erased himself, his original intention was to do the same to my client. His own death would merely have been incidental to his stated objective. The primary target of his malicious actions was still Delano Franklin."

With a sigh of infinite patience, I looked witheringly at Arkulian, then turned back to the judge. "Again, my esteemed colleague is mistaken."

The judge was actually listening now, fascinated by the implications. I had mapped out the strategy until it made my own head spin.

"My client is accused of ***attempted*** murder. However, based on these lab results, such an action would be temporally impossible." I waited a beat. "If Mr. Hendergast had actually succeeded in what the prosecution alleges was his intent, then he himself would never have been born. In which case, he could never have gone back in time to prevent Mr. Franklin's parents from meeting. How can my client be charged with attempting a crime that is fundamentally impossible to commit?"

"This is outrageous! Why not debate how many angels can dance on a pinhead?" Arkulian said.

I shrugged in the prosecutor's direction. "It's a standard time-travel paradox, your Honor. As Mr. Arkulian explained to the court so exhaustively."

Lionel was still staring in wonder over at the prosecutor's table. "Daddy?"

The judge rapped her gavel loudly. "I'm announcing a recess for at least two hours—so I can take some aspirin and give it time to work."

When the judge finally dismissed all charges against Lionel, I was relatively sure Arkulian wouldn't take it to appeal. The hardest part was explaining the convoluted matter to journalists afterward, so they could report it accurately; in the end, it proved too intricate for most of the wire services.

Aaron and I celebrated by going out for a fine dinner. We compared notes on cases, and he got me up to speed on his time-travel dinosaur-hunting lawsuit. I came back to the office late at night by myself—after all, that's where I kept the best bourbon—and saw the light blinking on the answering machine. Multiple messages. Four more cases waiting, none of them simple. Some actually sounded like they would be fun. Certainly precedent-setting.

Oddly, after the fallout, Lionel actually reconciled with his biological father. Months later, when I drove past one of Franklin's car dealerships, I saw a crew replacing the big sign with a new one: FRANKLIN & SON.

Funny how things turn out. Sometimes people just need a second chance, even when they aren't looking for it. ■

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Search Engine

Mary Rosenblum

Those little tags that are starting to appear in merchandise have more uses than you might think—and maybe more than you want.

A man's eyelids twitched as the tiny skull and crossbones icon flashed across his retinal screen. Uh-oh. He blinked away the image and scowled at the office door. The feds. "Sit tight and pay attention," he said to the new kid sitting in the chair beside the desk.

"What's up?" New Kid leaned forward. But the door was already opening, the soft whisper as it slid aside a reassurance that this was a high-end operation, that your money was being spent wisely. The real-life, physical office, the expensive woolen carpet and real wood furniture echoed that reassurance. No sleazy, virtual private eye here . . . you were at the top of the ladder in a hard office.

Not that the suit cared. He took off his shades, slipped 'em into the pocket of his very well made business tunic and fixed icy gray eyes on Aman's face. If he didn't like what he saw, he was too well trained to let it show. "Mr. Boutros." The suit didn't offer his hand, sat down immediately in the chair across from the desk. Cast New Kid a single pointed glance. Jimi. Aman remembered his name at last. Raul's latest, given to him to baby-sit and maybe even train.

"My assistant." Aman put finality in the tone. New Kid stays. He kept his body language relaxed and alpha, waited out the suit's evaluation of his options. Inclined his head at the suit's very slight nod. He had won that round. You won when you could. "How may I help you?"

The suit pulled a small leather case from inside his tunic, slipped a tiny data disk from it. Without a word, Aman extended a port. Clients did not store their files on the net. Not if they were paying Search Engine's fees. The disk clicked into place and Aman's desktop lit up. A man's head and shoulders appeared in the holofield, turning slowly. Medium-dark, about twenty, mixed Euro/African

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and Hispanic genes, Aman noted. About the same phenotype as New Kid—Jimi—a history of war, rape, and pillage made flesh. The runner's scalp gleamed naked, implanted with fiberlight gang-sign. Aman read it and sighed, thinking of his fight with Avi over his fiberlights. Tattoo your political incorrectness on your body for the cops, son. Just in case they don't notice you on their own. Stupid move, Avi. That hadn't been the final argument, but it had been damn close. Several data-file icons floated at the bottom of the field. Food preferences, clothing, personal services, sex. Aman nodded because the feds knew what he needed and it would all be here. "Urgency?" he asked.

"High." The suit kept his eyes on the runner's light-scribed profile.

Aman nodded. Jimi was getting tense. He didn't even have to look at him—the kid was radiating. Aman touched the icon bubbles, opening the various files, hoping Jimi would keep his mouth shut. Frowning, because you never wanted the client to think it was going to be easy, he scanned the rough summary of the runner's buying habits. Bingo. He put his credit where his politics were. Not a problem, this one. He was going to stand up and wave to get their attention. "Four days," he said. Start high and bargain. "Plus or minus 10 percent."

"Twenty-four hours." The suit's lips barely moved.

Interesting. Why this urgency? Aman shook his head. No kinky sex habits, no drugs, so they'd have to depend on clothes and food. Legal-trade data files took longer. "Three point five," he finally said. "With a failure-exemption clause."

They settled on forty-eight hours with no failure-exemption. "Ten percent bonus if you get him in less." The suit stood. For a moment he looked carefully and thoroughly at Jimi. Storing his image in the bioware overlay his kind had been enhanced with? If he ran into Jimi on the street a hundred years from now he'd remember him. Jimi had damn well better hope it didn't matter.

"They really want this guy." Jimi waited for the green light to come on over the door, telling them that the suit hadn't left anything behind that might listen. "The runner's wearing Gaiist sign."

No kidding. Aman knew that scrawl by heart.

"What did he do?"

"How the hell should I know?" Aman touched one of the file icons, closing his eyes as his own bioware downloaded and displayed on his retina. *That* had been the final argument with Avi.

"Oh, so we just do what we're told, I get it." Jimi leaned back, propped a boot up on the corner of the desktop. "Say yessir, no questions asked, huh? Who cares about the reason, as long as there's money?"

"He's government." Aman blinked the display away, ignored Jimi's boot. Why in the name of everyone's gods had Raul hired this wet-from-birth child? Well, he knew *why*. Aman eyed the kid's slender, androgynous build. His boss had a thing for the African/Hispanic phenotype. Once, he'd kept it out of the business. Aman suppressed a sigh, wondering if the kid had figured it out yet. Why Raul had hired him. "How much of the data-dredging that you do is legal?" He watched Jimi think about that. "You think we're that good, huh? That nobody ever busts us? There is always a price, kid, especially for success."

Jimi took his foot off the desktop. "The whole crackdown on the Gaiists is just crap. A bread-and-circus move because the North American Alliance . . ."

Aman held up a hand. "Good thing you don't write it on *your* head in light," he said mildly. "Just don't talk politics with Raul."

Jimi flushed. "So how come you let him back you down from four days? An Xuyen is already backed up with the

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Ferrogers search."

"We won't need Xuyen." Aman nodded at the icons. "Our runner is organic. Vegan. Artisan craft only, in clothes and personal items. You could find him all by yourself in about four hours."

"But if he's buying farm-raised and hand-made?" Jimi frowned. "No universal tags on those."

Aman promised himself a talk with Raul, but it probably wouldn't change anything. Not until he got tired of this one, anyway. "Get real." He got up and crossed to the small nondescript desktop at the back of the office, camouflaged by an expensive Japanese shoji screen. This was the real workspace. Everything else was stage-prop, meant to impress clients. "You sell stuff without a u-tag and you suddenly find you can't get a license, or your E. coli count is too high for an organic permit, or your handspinning operation might possibly be a front for drug smugglers." He laughed. "Everything has a u-tag in it." Which wasn't quite true, but knowledge was power. Jimi didn't have any claim on power yet. Not for free.

"Okay." Jimi shrugged. "I'll see if I can beat your four hours. Start with sex?'

"He's not a buyer. I'll do it."

"How come?" Jimi bristled. "Isn't it too easy for you? If even *I* can do it?"

Aman hesitated, because he wasn't really sure himself. "I just am." He sat down at his workdesk as Jimi stomped out . Brought up his secure field and transferred the files to it. The runner got his sex for free or not at all, so no point in searching that. Food was next on the immediacy list. Aman opened his personal searchware and fed the runner's ID chipprint into it. He wasn't wearing his ID chip any more, or the suit wouldn't have showed up here. Nobody had figured out yet how to make a birth-implanted ID chip really permanent. Although they kept trying. Aman's AI stretched its thousand thousand fingers into the datasphere and started hitting all the retail data pools. Illegal, of course, and retail purchase data was money in the bank, so it was well protected, but if you were willing to pay, you could buy from the people who were better than the people who created the protection. Search Engine, Inc. was willing to pay.

Sure enough, forsale.data had the kid's profile. They were the biggest. Most of the retailers fed directly to them. Aman pulled the runner's raw consumables data. Forsale profiled, but his AI synthesized a profile to fit the specific operation. Aman waited the thirty seconds while his AI digested the raw dates, amounts, prices of every consumable item the runner had purchased from the first credit he spent at a store to the day he paid to have a back-alley cutter remove his ID chip. Every orange, every stick of gum, every bottle of beer carried an RNA signature and every purchase went into the file that had opened the day the runner was born and the personal ID chip implanted.

The AI finished. The runner was his son's age. Mid-twenties. He looked younger. Testament to the powers of his vegetarian and organic diet? Aman smiled sourly. Avi would appreciate that. That had been an early fight and a continuing excuse when his son needed one. Aman scanned the grocery profile. It had amazed him, when he first got into this field, how much food reflected each person's life and philosophy. As a child, the runner had eaten a "typical" North American diet with a short list of personal specifics that Aman skipped. He had become a Gaiist at nineteen. The break was clear in the profile, with the sudden and dramatic shift of purchases from animal proteins to fish and then vegetable proteins only. Alcohol purchases flatlined, although marijuana products tripled, as did wild-harvest hallucinogenic mushrooms. As he expected, the illegal drug purchase history revealed little. The random na-

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ture of his purchases suggested that he bought the drugs for someone else or a party event rather than for regular personal consumption. No long-term addictive pattern.

A brief, steady purchase rate of an illegal psychotropic, coupled with an increase in food purchase volume suggested a lover or live-in friend with an addiction problem, however. The sudden drop-off suggested a break up. Or a death. The food purchases declined in parallel. On a whim, because he had time to spare, Aman had his AI correlate the drop off of the drug purchases to the newsmedia database for Northwestern North America, the region where the drug purchases were made. Bingo. A twenty-year-old woman had died within eighteen hours of the last drug purchase. His lover? Dead from an overdose? Aman's eyes narrowed. The cause of death was listed as heart failure, but his AI had flagged it.

"Continue." He waited out the seconds of his AI's contemplation.

Insufficient data, it murmured in its androgynous voice. *Continue?* Aman hesitated because searches like this cost money, and the connection was weak, if there at all. "Continue." No real reason, but he had learned long ago to follow his hunches.

He was the last one out of the office, as usual. The receptionist said good night to him as he crossed the plush reception area, her smile as fresh as it had been just after dawn this morning. As the door locked behind him, she turned off. Real furniture and rugs meant money and position. Real people meant security risks. The night watchman—another holographic metaphor—wished him good night as he crossed the small lobby. Koi swam in the holographic pond surrounded by blooming orchids. Huge vases of flowers—lilies today—graced small tables against the wall. The display company had even included scent with the holos. The fragrance of lilies followed Aman out onto the street. He took a pedal taxi home, grateful that for once, the small wiry woman on the seat wasn't interested in conversation as she leaned on the handlebars and pumped them through the evening crush in the streets.

He couldn't get the suit out of his head tonight. Jimi was right. The Gaiists were harmless, back-to-the-land types. The feds wanted this kid for something other than his politics, although that might be the media reason. Absently, Aman watched the woman's muscular back as she pumped them past street vendors hawking food, toys, and legal drugs, awash in a river of strolling, eating, buying people. He didn't ask "why" much any more. Sweat slicked the driver's tawny skin like oil. Maybe it was because the runner was the same age as Avi and a Gaiist as well. Aman reached over to tap the bell and before the silvery chime had died, the driver had swerved to the curb. She flashed him a grin at the tip as he thumbprinted her reader, then she sped off into the flow of taxis and scooters that clogged the street.

Aman ducked into the little grocery on his block, enjoying the relief of its nearly empty aisles this time of night. He grabbed a plastic basket from the stack by the door and started down the aisles. *You opened the last orange juice today,* the store's major-domo spoke to him in a soft, maternal voice as he strode past the freezer cases. True. The store's major-domo had scanned his ID chip as he entered, then uplinked to smartshopper.net, the inventory control company he subscribed to. It had searched his personal inventory file to see if he needed orange juice and the major-domo had reminded him. He tossed a pouch of frozen juice into his basket. The price displayed on the basket handle, a running total that grew slowly as he added a couple of frozen dinners and a packaged salad. *The Willamette Vineyard's Pinot Gris is on*

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sale this week. The major-domo here at the wine aisle used a rich, male voice. *Three dollars off.* That was his favorite white. He bought a bottle, and made his way to the checkout gate to thumbprint the total waiting for him on the screen.

"Don't we make it easy?"

Aman looked to up find Jimi lounging at the end of the checkout kiosks.

"You following me?" Aman loaded his groceries into a plastic bag. "Or is this a genuine coincidence?'

"I live about a block from your apartment." Jimi shrugged. "I always shop here." He hefted his own plastic bag. "Buy you a drink?"

"Sure," Aman said, to atone for not bothering to know where the newbie lived. They sat down at one of the sidewalk tables next to the grocery, an island of stillness in the flowing river of humanity.

"The usual?" the table asked politely. They both said yes, and Aman wondered what Jimi's usual was. And realized Jimi was already drunk. His eyes glittered and a thin film of sweat gleamed on his face.

Not usual behavior. He'd looked over the intoxicant profiles himself when they were considering applicants. Aman sat back as a petite woman set a glass of stout in front of him and a mango margarita in front of Jimi. Aman sipped creamy foam and bitter beer, watched Jimi down a third of his drink in one long swallow. "What's troubling you?"

"You profile all the time?" Jimi set the glass down a little too hard. Orange slurry sloshed over the side, crystals of salt sliding down the curved bowl of the oversized glass. "Does it ever get to you?"

"Does what get to me?"

"That suit owned you." Jimi stared at him. "That's what you told me."

"They just think they do." Aman kept his expression neutral as he sipped more beer. "Think of it as a trade."

"They're gonna crucify that guy, right? Or whack him. No fuss, no muss."

"The government doesn't assassinate people," Aman said mildly.

"Like hell. Not in public, that's for sure."

Well, the indication had been there in Jimi's profile. He had been reading the fringe e-zines for a long time, and had belonged to a couple of political action groups that were on the "yellow" list from the government . . . not quite in the red zone, but close. But the best profilers came from the fringe. You learned early to evaluate people well, when you had to worry about betrayal.

"I guess I just thought I was working for the good guys, you know? Some asshole crook, a bad dealer, maybe the jerks who dump their kids on the public. But this . . ." He emptied his glass. "Another." He banged the glass down on the table.

You have exceeded the legal limit for operating machinery, the table informed him in a sweet, motherly voice. *I will call you a cab if you wish. Just let me know.* A moment later, the server set his fresh margarita down in front of him and whisked away his empty.

"Privacy, what a joke." Jimi stared at his drink, words slurring just a bit. "I bet there's a record of my dumps in some data-base or other."

"Maybe how many times you flush."

"Ha-ha." Jimi looked at him blearily, the booze hitting him hard and fast now. "When d'you stop asking why? Huh? Or did you ever ask?"

"Come on." Aman stood up. "I'll walk you home. You're going to fall down."

"I'm not that drunk," Jimi said, but he stood up. Aman caught him as he swayed. "Guess I am." Jimi laughed loudly enough to make heads turn. "Guess I should get used to it, huh? Like you."

"Let's go." Aman moved him, not all that gently. "Tell me where we're going."

"We?"

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"Just give me your damn address."

Jimi recited the number, sulky and childlike again, stumbling and lurching in spite of Aman's steadying arm. It was one of the cheap and trendy loft towers that had sprouted as the neighborhood got popular. Jimi was only on the sixth floor, not high enough for a pricey view. Not on his salary. The door unlocked and lights glowed as the unit scanned Jimi's chip and let them in. Music came on, a retro-punk nostalgia band that Aman recognized. A cat padded over and eyed them greenly, its golden fur just a bit ratty. It was real, Aman realized with a start. Jimi had paid a hefty fee to keep a flesh-and-blood animal in the unit.

"I got to throw up," Jimi mumbled, his eyes wide. They made it to the tiny bathroom . . . barely. Afterward, Aman put him to bed on the pull-out couch that served as bed in the single loft room. Jimi passed out as soon as he hit the pillow. Aman left a wastebasket beside the couch and a big glass of water with a couple of old-fashioned aspirin on the low table beside it. The cat stalked him, glaring accusingly, so he rummaged in the cupboards of the tiny kitchenette, found cat food pouches, and emptied one onto a plate. Set it on the floor. The cat stalked over, its tail in the air.

It would be in the database, that Jimi owned a cat. And tonight's bender would be added to his intoxicant profile, the purchase of the margaritas tallied neatly, flagged because this wasn't usual behavior. If his productivity started to fall off, Raul would look at that profile first. He'd find tonight's drunk.

"Hey."

Aman paused at the door, looked back. Jimi had pushed himself up on one elbow, eyes blurry with booze.

"Thanks . . . fr feeding him. I'm not . . . a drunk. But you know that, right?"

"Yeah," Aman said. "I know that."

"I knew him. Today. Daren. We were friends. Kids together, y'know? Were you ever a kid? Suit's gonna kill him. You c'd tell." Tears leaked from the corners of his eyes. "How come? You didn't even ask. You didn't even ask me if I knew him."

Damn. He'd never even thought of looking for a connection there. "I'm sorry, Jimi," Aman said gently. But Jimi had passed out again, head hanging over the edge of the sofa. Aman sighed and retraced his steps, settling the kid on the cushions again. Bad break for the kid. He stared down at Jimi's unconscious sprawl on the couch-bed. *Why?* Didn't matter. The suit wouldn't have told them the truth. But Jimi was right. He should have asked. He thought about today's profile of the runner, that break where he had changed what he ate, what he wore, what he spent his money on. You could see the break. What motivated it . . . that you could only guess at.

What would Avi's profile look like?

No way to know. Avi's break had been a back-cutter.

Aman closed the door and listened to the unit lock it behind him.

He carried his groceries the few scant blocks to his own modest condo tower. No music came on with the lights. No cat, just Danish furniture and an antique Afghani carpet knotted by the childhood fingers of women who were long dead now. He put the food away, stuck a meal in the microwave, and thought about pouring himself another beer. But the stout he'd drunk with Jimi buzzed in his blood like street-grade amphetamine. He smiled crookedly, thinking of his grandfather, a devout man of Islam, and his lectures about the demon's blood, alcohol. It felt like demon's blood tonight. The microwave chimed. Aman set the steaming tray on the counter to cool, sat down cross-legged on the faded wool patterns of crimson and blue, and blinked his bioware open.

His AI had been working on the profile. It presented him with five options. Aman settled down to review the run-

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ner's profile first. It wasn't all a matter of data. You could buy a search AI, and if that was all there was to it, Search Engine Inc. wouldn't be in business. Intuition mattered—the ability to look beyond the numbers and sense the person behind them. Aman ran through the purchases, the candy bars, the vid downloads for the lonely times, the gifts that evoked the misty presence of the girlfriend, the hope of love expressed in single, cloned roses, in Belgian chocolate, and tickets in pairs. They came and went, three of them for sure. He worried about his weight, or maybe just his muscles for a while, buying gym time and special foods.

Someone died. Aman noted the payments for flowers, the crematorium, a spike in alcohol purchases for about three months. And then . . . the break. Curious, Aman opened another file from the download the suit had given him, read the stats. Daren had been a contract birth—the new way for men to have children. Mom had left for a career as an engineer on one of the orbital platforms. Nanny, private school. The flowers had been for Dad, dead at 54 from a brain aneurysm.

He had joined the Gaiists after his father had died.

Unlike Avi, who hadn't waited.

Aman looked again at the five profiles the AI had presented. All featured organic, wild harvest, natural fiber purchasing profiles. Three were still local. One had recently arrived in Montreal, another in the Confederacy of South America, in the state of Brazil. Aman scanned the data. That one. He selected one of the local trio. The purchases clustered northeast of the city in an area that had been upscale suburb once, was a squalid cash-worker settlement now. He was walking. Couldn't use mass transit without a chip and didn't have access to a vehicle, clearly. Naïve. Aman let his breath out slowly. Frightened. A little kid with his head under the sofa cushions, thinking he was invisible that way. He wondered sometimes if he could find Avi. It would be a challenge. His son knew how he worked. He knew how to really hide.

Aman had never looked.

On a whim, he called up the AI's flag from his earlier search. It had flagged the woman who had died, who had probably been a live-in friend or lover. This time, the AI presented him with clustered drug overdose deaths during the past five years. A glowing question mark tagged the data, crimson, which meant a continuation would take him into secure and unauthorized data. Pursue it? He almost said no. "All right, Jimi." He touched the blood-colored question mark. "Continue." It vanished. Searching secure government data files was going to cost. He hoped he could come up with a reason for Raul, if he caught it.

His legs wanted to cramp when Aman finally blinked out of his bioware and got stiffly to his feet. The AI hadn't yet finished its search of the DEA data files. The meal tray on the counter was cold and it was well past midnight. He stuck the tray in the tiny fridge and threw himself down on the low couch. Like Jimi, but not drunk on margaritas.

In the morning, he messaged Raul that he wasn't feeling well and asked if he should come in. As expected, Raul told him no way, go get a screen before you come back. You could count on Raul with his paranoia about bioterrorism.

It wasn't entirely a lie. He wasn't feeling well. *Well* covered a lot of turf. The AI had nothing for him on the overdose cluster it had flagged and that bothered him. There wasn't a lot of security that could stop it. He emailed Jimi, telling him to work on the Sauza search on his own and attaching a couple of non-secure files that would give him something he could handle in what would surely be a fuzzy and hungover state of mind. He found the clothes he needed

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at the back of his closet, an old, worn tunic-shirt and a grease-stained pair of jeans. He put on a pair of scuffed and worn out boots he'd found in a city recycle center years ago, then caught a ped-cab to the light rail and took the northeast run. He paid cash to the wary driver and used it to buy a one-way entry to the light rail. Not that cash hid his movements. He smiled grimly as he found a seat. His ped-cab and light rail use had been recorded by citizen.net, the data company favored by most transportation systems. It would just take someone a few minutes longer to find out where he had gone today.

City ran out abruptly in the Belt, a no-man's-land of abandoned warehouses and the sagging shells of houses inhabited by squatters, the chipless bilge of society. Small patches of cultivation suggested an order to the squalid chaos. As the train rocketed above the sagging roofs and scrubby brush that had taken over, he caught a brief snapshot glimpse of a round-faced girl peering up at him from beneath a towering fountain of rose canes thick with bright pink blossoms. Her shift, surprisingly clean and bright, matched the color of the roses perfectly and she waved suddenly and wildly as the train whisked Aman past. He craned his neck to see her, but the curve of the track hid her instantly.

At his stop, he stepped out with a scant handful of passengers, women mostly and a couple of men, returning from a night of cleaning or doing custom handwork for the upscale clothiers. None of them looked at him as they plodded across the bare and dirty concrete of the platform, but a sense of observation prickled the back of his neck.

Why would anyone be following him? But Aman loitered to examine the melon slices and early apples hawked by a couple of bored boys at the end of the platform. He haggled a bit, then spun around and walked quickly away—which earned him some inventive epithets from the taller of the boys. No sign of a shadow. Aman shrugged and decided on nerves. His AI's lack of follow-up data bothered him more with every passing minute. The rising sun already burned the back of his neck as he stepped off the platform and into the street.

The houses here were old, roofs sagging or covered with cheap plastic siding, textured to look like wood and lapped to shed rain. It was more prosperous than the no-man's-land belt around the city center, but not by much. Vegetables grew in most of the tiny yards, downspouts fed hand-dug cisterns and small, semi-legal stands offered vegetables, home-made fruit drinks, snacks, and various services—much like the street vendors on his block, but out here, the customers came to the vendors and not the other way around.

He paused at a clean-looking stand built in what had been a parking strip, and bought a glass of vegetable juice, made in front of his eyes in an antique blender. The woman washed the vegetables in a bucket of muddy water before she chopped them into the blender, but he smelled chlorine as he leaned casually on the counter. Safe enough. His vaccinations were up to date, so he took the glass without hesitation and drank the spicy, basil-flavored stuff. He didn't like basil particularly, but he smiled at her. "Has Daren been by today?" He hazarded the runner's real name on the wild chance that he was too naïve to have used a fake. "He was supposed to meet me here. Bet he overslept."

Her face relaxed a bit, her smile more genuine. "Of course." She shrugged, relaxing. "Doesn't he always? I usually see him later on. Like noon." And she laughed a familiar and comfortable "we're all friends" laughter.

He was using his real name. Aman sipped some more of the juice, wanting to shake his head. Little kid with his head under the friendly sofa cushions. A

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figure emerged from a small, square block of a house nearly invisible beneath a huge tangle of kiwi and kudzu vines and headed their way, walking briskly, his hand-woven, natural-dyed tunic as noticeable as a bright balloon on this street. Loose drawstring pants woven of some tan fiber and the string of carved beads around his neck might as well have been a neon arrow pointing. "Ha, there he is," Aman said, and the woman's glance and smile confirmed his guess. Aman waited until the runner's eyes were starting to sweep his way, then stepped quickly forward. "Daren, it's been forever." He threw his arms around the kid, hugging him like a long-lost brother, doing a quick cheek-kiss that allowed him to hiss into the shocked kid's ear, "*Act like we're old friends and maybe the feds won't get you. Don't blow this.*"

The kid stiffened, panic tensing all his muscles, fear sweat sour in Aman's nostrils. For a few seconds, the kid thought it over. Then his muscles relaxed all at once, so much so that Aman's hands tightened instinctively on his arms. He started to tremble.

"Come on. Let's take a walk," Aman said. "I'm not here to bust you."

"Let me get some juice . . ."

"No." Aman's thumb dug into the nerve plexus in his shoulder and the kid gasped. "Walk." He twisted the kid around and propelled him down the street, away from the little juice kiosk, his body language suggesting two old friends out strolling, his arm companionably over the kid's shoulder, hiding the kid's tension with his own body, thumb exerting just enough pressure on the nerve to remind the kid to behave. "You are leaving a trail a blind infant could follow," he said conversationally, felt the kid's jerk of reaction.

"I'm not chipped." Angry bravado tone.

"You don't need to be chipped. That just slows the search down a few hours. You went straight from the hack-doc to here, walked through the Belt because you couldn't take the rail, you buy juice at this stand every day, and you bought those pants two blocks up the street, from the lady who sells clothes out of her living room. Want me to tell you what had for dinner last night, too?"

"Oh, Goddess," he breathed.

"Spare me." Aman sighed. "Why do they want you? You blow something up? Plant a virus?"

"Not us. Not the Gaiists." He jerked free of Aman's grip with surprising strength, fists clenched. "That's all a lie. I don't know why they want me. Yeah, they're claiming bioterrorism, but I didn't do it. There wasn't any virus released where they said it happened. How can they *do* that? Just make something up?" His voice had gone shrill. "They have to have proof and they don't have any proof. Because it didn't happen."

He sounded so much like Avi that Aman had to look away. "They just made it all up, huh?" He made his voice harsh, unbelieving.

"I . . . guess." The kid looked down, his lip trembling. "Yeah, it sounds crazy, huh? I just don't get *why*. Why *me*? I don't even do protests. I just . . . try to save what's left to save."

"Tell me about your girlfriend."

"Who?" He blinked at Aman, his eyes wet with tears.

"The one who died."

"Oh. Reyna." He looked down, his expression instantly sad. "She really wanted to kick 'em. The drugs. I tried to help her. She just . . . she just had so much fear inside. I guess . . . the drugs were the only thing that really helped the fear. I . . . I really tried."

"So she killed herself?"

"Oh, no." Daren looked up at him, shocked. "She didn't want to *die*. She just didn't want to be afraid. She did the usual hit that morning. I guess . . . the guy she bought from—he called himself Skinjack—I guess he didn't cut the stuff right. She ODed. I . . . went looking for

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him." Daren flushed. "I told myself I was going to beat him up. I guess . . . maybe I wanted to kill him. Because she was getting better. She would have made it." He drew a shaky breath. "He just disappeared. The son of a bitch. I kept looking for him but . . . he was just gone. Maybe he ODed, too," he added bitterly. "I sure hope so."

All of a sudden, it clicked into place. The whole picture.

Why.

They had reached an empty lot. Someone was growing grapes in it and as they reached the end of the rows, sudden movement in the shadows caught Aman's eye. Too late. He was so busy sorting it all out, he'd stopped paying attention. The figure stepped out of the leaf shadows, a small, ugly gun in his hand.

"I was right." Jimi's eyes glittered. "Didn't think I was smart enough to track you, huh? I'm stupid, I know, but not that stupid."

"Actually, I thought you'd be too hung over." Aman spread his hands carefully. "I think we're on the same side here, and I think we need to get out of here *now*."

"Shut up," Jimi said evenly, stepping closer, icy with threat. "Just shut *up*."

"Jimi?" Daren pushed forward, confused. "Goddess, I haven't seen you . . . what are you doing?"

"He found you," Jimi said between his teeth. "For the feds. You're not hiding very well, Daren, you idiot. Everything you buy has a damn tag on it. He looked up your buying habits and picked you out of the crowd, just like that. He laughed about how easy it was. You were too easy for him to even give the job to a newbie like me." Jimi's eyes burned into the kid's. "You got to . . ."

Aman shifted his weight infinitesimally, made a tiny, quick move with his left hand, just enough to catch Jimi's eye. Jimi swung right, eyes tracking, gun muzzle following his eyes. Aman grabbed Jimi's gun hand with his right hand, twisted, heard a snap. With a cry Jimi let go of the gun and Aman snatched it from the air, just as Daren tackled him, grabbing for the weapon. The hissing snap of a gas-powered gunshot ripped the air. Again. Aman tensed, everything happening in slow motion now. No pain. Why no pain? Hot wetness spattered his face and Jimi sprawled backward into the grape leaves, arms and legs jerking. Aman rolled, shrugging Daren off as if he weighed nothing, seeing the suit now, three meters away, aiming at Daren.

Aman fired. It was a wild shot, a crazy shot, the kind you did in sim-training sessions and knew you'd never pull off for real.

The suit went down.

Aman tried to scramble to his feet, but things weren't working right. After a while, Daren hauled him the rest of the way up. White ringed his eyes and he looked ready to pass out from shock.

"He's dead. Jimi. And the other guy." He clung to Aman, as if Aman was supporting him and not the other way around. "Goddess, you're bleeding."

"Enough with Goddess already." Aman watched red drops fall from his fingertips. His left arm was numb, but that wouldn't last.

"Why? What in the . . . what the *hell* is going on here?" His fingers dug into Aman's arm.

"Thank you." Hell was about right. "We need to get out of here. Do you know the neighborhood?"

"Yes. Sort of. This way." Daren started through the grapes, his arm around Aman. "I'm supposed to meet . . . a ride. This afternoon. A ride to . . ." He gave Aman a sideways, worried look. "Another place."

"You're gonna have to learn some things . . ." Aman had to catch his breath. "Or you're gonna bring the suits right after you." After that he stopped talking. The numbness was wearing off. Once, years and years ago, he had worked as private security, licensed for

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lethal force, paying his way though school. A burglar shot him one night.

It hurt worse than he remembered, like white-hot spears digging into his shoulder and side with every step. He disconnected himself from his body after a while, let it deal with the pain. He wondered about Jimi's cat. Who would take care of it? Raul would be pissed, he thought dreamily. Not about Jimi. Raul had no trouble finding Jimis in the world. But Aman was a lot better than Raul. Better even than An Xuyen, although Xuyen didn't think so. Raul would be pissed.

He blinked back to the world of hot afternoon and found himself sitting in dim light, his back against something solid.

"Man, you were out on your feet." The kid squatted beside him, streaked with sweat, drying blood, and gray dust, his face gaunt with exhaustion and fear. Daren, not Jimi. Jimi was dead.

"I don't have any first aid stuff, but it doesn't look like you're bleeding too much anymore. Water?" He handed Aman a plastic bottle. "It's okay. It's from a clean spring."

Aman didn't really care, would have drunk from a puddle. The ruins of an old house surrounded them. The front had fallen—or been torn—completely off, but a thick curtain of kudzu vine shrouded the space. Old campfire scars blackened the rotting wooden floor. The Belt, he figured. Edge of it, anyway.

"What happened?" Daren's voice trembled. "Why did he shoot Jimi? Who was he? Who are *you?*"

The water helped. "What sent you to get hacked?" Aman asked.

"Someone searched my apartment." The kid looked away. "I found . . . a bug in my car. I'm . . . good at finding those. I . . . told some of my . . . friends . . . and they said go invisible. It didn't matter if I'd done anything or not. They were right." His voice trembled. "I'd never do what they said I did."

"They know you didn't do anything."

Aman closed his eyes and leaned back against the broken plasterboard of the ruined wall. Pain thudded through his shoulder with every beat of his heart. "It's the guy who killed your girlfriend."

"Why? I never hurt him. I never even found him . . ."

"You looked for him," Aman mumbled. "That scared 'em."

The kid's blank silence forced his eyes open.

"I'm guessing the local government is running a little . . . drug eradication program by eliminating the market," he said heavily. Explaining to a child. "They cut a deal with the street connections and probably handed them a shipment of . . . altered . . . stuff to put into the pipeline. Sudden big drop in users."

"Poisoned?" Daren whispered. "On purpose?"

"Nasty, huh? Election coming up. Numbers count. And who looks twice at an OD in a confirmed user?" Aman kept seeing Jimi's childlike curl on the couch, the cat regarding him patiently. Couldn't make it go away. "Maybe they thought you had proof. Maybe they figured you'd guess and tell your . . . friends. They might make it public." He started to shrug . . . sucked in a quick breath. Mistake. Waited for the world to steady again. "I should have guessed . . . the suit would know about Jimi. Would be tailing him." That was why the long look in the office. Memory impression so the suit could spot him in a crowd. "I figured it out just too late." His fault, Jimi's death. "How soon are your people going to pick you up?"

"Soon. I think." The kid was staring at the ground, looked up suddenly. "How come you came after me? To arrest me?"

"Listen." Aman pushed himself straighter, gritted his teeth until the pain eased a bit. "I told you you're leaving a trail like a neon sign. You listen hard. You got to think about what you buy . . . food, clothes, toothpaste, okay?" He stared into the kid's uncom-

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prehending face, willing him to get it. "It's all tagged, even if they say it's not. Don't doubt it. I'm telling you truth here, okay?"

The kid closed his mouth, nodded.

"You don't buy exactly the opposite—that's a trail we can follow, too—but you buy random. Maybe vegan stuff this time, maybe a pair of synth-leather pants off the rack at a big chain next purchase. Something you'd never spend cash on. Not even before you became a Gaiist, got it? You think about what you really want to buy. The food. The clothes. The snacks, toys, services. And you only buy them every fifth purchase, then every fourth, then every seventh. Got it? Random. You do that, buy stuff you don't want, randomly, and without a chip, you won't make a clear track. You'll be so far down on the profile that the searcher won't take you seriously.

"I've been buying in the Belt," the kid protested.

"Doesn't matter." He had explained why to Jimi. Couldn't do it again. Didn't have the strength. Let his eyes droop closed.

"Hey." The kid's voice came to him from a long way away. "I got to know. How come you came after me? To tell me how to hide from you? You really want me to believe that?"

"I don't care if you do or not." Aman struggled to open his eyes, stared into the blurry green light filtering through the kudzu curtain. "I'm . . . not sure how come I followed you." Maybe because he hadn't asked why and Jimi had. Maybe because Avi had been right and the job had changed him after all.

"But why? You a closet Gaiist?"

Aman wanted to laugh at that, but he didn't. It would hurt too much.

Voices filtered through nightmares full of teeth. People talking. No more green light, so it must be almost dark. Or maybe he was dying. Hard to tell. Footsteps scuffed and the kid's face swam into view, Jimi's at first, morphing into the other kid . . . Daren. He tried to say the name but his mouth was too dry.

"We're gonna drop you at an emergency clinic." Daren leaned close, his eyes anxious. "But . . . well, I thought maybe . . . you want to go with us? I mean . . . they're going to find out you killed that fed guy, right? You'll go to prison."

Yes, they would find out. But he knew how it worked. They'd hold the evidence and the case open. No reason to risk pointing some investigative reporter toward the little dope deal they'd been covering up. They'd have expectations, and he'd meet them, and Jimi's death would turn out to have been another nasty little killing in the Belt. He could adopt Jimi's cat. No harm done. Just between us.

"I'll come with you," he croaked. "You could use some help with your invisibility. And I have the track to the proof you need . . . about that drug deal. Make the election interesting." Wasn't pleading. Not that. Trade.

"You can't come chipped." A woman looked over Daren's shoulder, Hispanic, ice cold, with an air that said she was in charge. "And we got to go *now*."

"I know." At least the chip was in his good shoulder.

She did it, using a tiny laser scalpel with a deft sureness that suggested med school or even an MD. And it hurt, but not a lot compared to the glowing coals of pain in his left arm and then they were loading him into the back of a vehicle and it was fully dark outside.

He was invisible. Right now. He no longer existed in the electronic reality of the city. If he made it back to his apartment, it wouldn't let him in. The corner store wouldn't take his card or even cash. He felt naked. No, he felt as if he no longer existed. Death wasn't as complete as this. Wondered if Avi had felt like that at first. I probably could have found him, he thought. If I'd had the guts to try.

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"I'm glad you're coming with us." Daren sat beside him as the truck or whatever it was rocked and bucked over broken pavement toward the nearest clear street. "Lea says you probably won't die."

"I'm thrilled."

"Maybe we can use the drug stuff to influence the election, get someone honest elected."

He was as bad as Jimi, Aman thought. But . . . why not hope?

"You'll like the head of our order," Daren said thoughtfully. "He's not a whole lot older than me, but he's great. Really brilliant and he cares about every person in the order. *She* really matters to him . . . the Earth, I mean. Avi will really welcome you."

Avi.

Aman closed his eyes.

"Hey, you okay?" Daren had him by the shoulders. "Don't die now, not after all this." He sounded panicky.

"I won't," Aman whispered. He managed a tiny laugh that didn't hurt too bad.

Maybe it hadn't been the final fight after all.

Could almost make him believe in Avi's Goddess. Almost.

"Your head of the order sucks at hiding," he whispered. And fainted.

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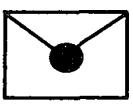

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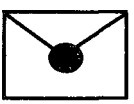

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Give Up the Ghost

Grey Rollins

When people say they see something, they probably do. *What* they see is another question. . . .

"Ghosts, sir."

I frowned. What was I to do, call him a liar? What he was saying was not credible to any rational person and had it been anyone other than Willard Jacoby, I would have dismissed the statement out of hand. As it was, Jacoby had no more imagination than a turnip, and so the inescapable conclusion was that he was either mistaken or the victim of a cruel hoax. Whatever the explanation, the man was clearly deeply shaken.

"Seen them myself, sir!" he insisted, sensing my skepticism.

I didn't need this. Matters on Bounty had reached a bit of a crisis a year ago, leading to a small contingent of military men and a few new political officers—such as myself—being sent to see what, if anything, could be done to prevent things from boiling over.

Precious little, as it turned out. We'd arrived too late. Tragically so. Granted, it was already too late by the time the fateful message arrived on Earth; matters had achieved such momentum that they carried through to their awful conclusion long before any possible help could have arrived from Earth.

Thirty-seven people had died, including Governor Silas Whirter. Now it was up to me to salvage the colony on Bounty. The better part of one hundred and seventy billion had been spent to found the colony. Things had then proceeded to go about as far wrong as wrong could go. Now, with the demoralized survivors muttering that there were ghosts, everyone wanted to leave, including the military men. Human nature being what it is, no one wanted to live on a planet inhabited by the ghosts of the murdered colonists.

The problem with that, of course, was that Earth was not easily going to forget the vast sums of money invested. The possibility of ghosts was purely, simply, utterly unacceptable.

* * *

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Late the next afternoon, Nicholas Carstairs's face appeared over my desk. "A message, sir. From Earth."

"Damn," I muttered quietly. Trouble troubles those who already have troubles. "Very well, Carstairs, I'll take it here."

"Yessir."

His face was replaced with a dark blue rectangle. The interior of the rectangle gave forth a slowly turning golden globe, a stylized planet. A spear and a trident crossed over the planet, symbolizing land and sea. The image faded, to be replaced with the oath of the Planetary Settlement Commission. An oath I'd taken many years ago. I didn't need to be reminded of the words, but every message from Earth began this way. Tradition, and a not-so-subtle reminder of where our loyalties lay. The oath dissolved, revealing the face of Winston Eversol, my superior. "Good afternoon, Oliver. I hope that this message finds you in good health."

Obligatory salutations out of the way, he paused and his face soured, as though he suddenly found himself with a mouthful of lemons. "I don't need to remind you that the political situation here on Earth is . . . delicate, to say the least. The news from Bounty, the deaths, and the subsequent near-loss of the colony have caused considerable difficulties for the PSC. Considerable. The United Nations has, once more, delayed a final vote on the new budget, primarily because they aren't pleased with recent events there on Bounty and the amount of money that's been spent for, so far, little or no return. Not to mention the unfavorable press." Eversol paused, obviously choosing his words carefully. "Not to put any undue pressure on you, but we need an update on your progress in turning the colony around, and we need it to be positive. Very positive.

"I know this is rather a rush, but the regular quarterly report won't come soon enough to help us with this budget problem, so I'm in the unfortunate position of having to ask you to cobble together something a bit early. Next week should be soon enough, though it would be better still if you could have it in by this Friday." He managed to contrive an apologetic expression, the bastard. "Sorry, Oliver. I know this is a hell of a rush, but do your best. Good luck."

And his image disappeared.

Good thing the broadcast was single-ended. It kept me from saying anything ill considered to his face. Nearly forty people dead, demoralized colonists who wanted to abandon the colony and go home, and now ghosts . . . and somehow I was supposed to stir the pot and make the stew palatable to those sitting in comfy leather chairs in the glass-walled skyscraper in London.

"Carstairs!" I bellowed.

"Yessir," he said instantly, his face appearing above my desk.

"We're in a bit of a pickle, here. Eversol wants an upbeat report on the conditions here, and he wants it yesterday."

Carstairs blinked—about as much emotion as he allowed himself to show. "Upbeat, sir?"

I nodded. "Upbeat. There's some sort of budget power play going on back on Earth, and we appear to be the fulcrum. Bounty has acquired a reputation of an unfortunate nature, and it's up to us to tart it up a bit so that it sits well with those who write the checks."

Carstairs took a deep breath. "Tall order, sir."

"That it is, Carstairs. That it is."

After instructing Carstairs to pull the last quarterly report and use it as a template for the current rush job, I asked him to round up Jacoby for me.

"Uh, sir, how much of the last report am I to use?" Carstairs asked.

"As much as possible. Obviously, we'll have to paste in new economic data . . . let's use last Friday as the cutoff date. Spruce up the flowery parts with a few word changes here and there so that it's not quite so obvious that it's the old news all over again. Try to find good

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things to say."

His face went bland, a sure sign that he was unhappy. "But, sir, we pulled out all the stops last time. How am I to top what we've already said?"

I'm given to more dramatic displays than Carstairs, whose father must have been a marble statue. I drummed my fingers on the desk for a moment. "Very well, don't try to top the last report, just make this one sound more-or-less equal to it. Do your best, lad. I'm not going to break you over this. I'll help with some of the harder parts after I see about this ghost thing."

If he felt relief over my offer to help, he hid it well. "Yessir," he said evenly, and his image winked out.

I hardly had time to take a breath before Jacoby knocked lightly on the door. Trust Carstairs to have him here before I could collect my thoughts.

"Come in," I called.

He approached the desk as though he were walking on eggshells. "Sir?" There was unease on his face. Fear, perhaps. A premonition of what was to come. He stood ramrod straight in front of my desk, as though facing a commanding officer. Though I have nominal authority over the military contingent, I don't demand that they treat me as part of their chain of command. However, their officers seem to have ordered them to extend every courtesy, up to and including formal obedience to my wishes.

"Jacoby, yesterday you told me you'd seen a ghost. I'm afraid I must ask you to help me get to the bottom of this matter."

He winced visibly. "Um, sir, I'm not . . . I mean, I don't know anything about ghosts. Perhaps the chaplain would be—"

"You said you'd seen them, or at least one, right?"

Jacoby looked as though he was regretting telling me about that. "Yessir."

"Then you know more about ghosts than I do for the good and simple reason that I know nothing whatsoever about the subject. I'd like for you to accompany me and tell me what you know about them."

I did not need to be psychic to divine his thoughts. He was weighing the consequences of an outright refusal against the obvious fear that he felt. His sense of duty won. Barely. "You mean go up to the Step, sir?" He paused for a heartbeat. "Of course, sir. Glad to," he said weakly.

"Jacoby, I'll not ask you to do anything that will put you in harm's way. Just think of this as a fact-finding mission."

"Reconnaissance," he said, putting it in terms that made sense to him.

"Just so. And if things go badly, we'll pull out and head for home. It's not as though I intend to establish a beachhead on the shores of Hades. I just want to see what you mean when you say that you've seen ghosts."

"Dead people, sir."

I had to smile at that. "Yes, Jacoby, I'd assumed that's what you meant. But I want to see them for myself."

He swallowed visibly. "Um, today, sir? It's getting on in the afternoon, and—"

"Tomorrow will do, Jacoby. First thing in the morning."

He nodded tightly. "Yessir. Will that be all, sir?"

I nodded. "Yes, Jacoby."

Carstairs would have made it through the conversation with his usual stony expression, but that wasn't Jacoby's nature. He left looking as though he wanted to update his Will.

The next morning was thick with fog and rain. I stood glaring out my office window at the weather and at a Cashew, a native life form. It was hanging upside-down from the eaves by its hind legs, staring back at me imperturbably. Rain dripped unheeded from its soft, cupped ears to the ground below. Without turning, I said, "Carstairs?"

"Yessir," came his voice from over my right shoulder, as though he were standing in front of my desk.

"Call young Jacoby and tell him that

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we will not be attempting the trip this morning. Schedule it for tomorrow morning, if at all possible."

"Yessir."

"Carstairs?"

"Yessir?"

"Track down someone else who claims to have seen these ghosts. Have them come in for an interview."

"Yessir."

Just under twenty minutes later a slender woman came through my door. I laid aside the report from the botanists down at the coast and gestured her to my visitor's seat. Belatedly, I noticed the mud splashed up her calves and realized what an ass I'd been. Just because I didn't like the weather was no excuse to make others suffer.

"How thoughtless of me," I began. "Allow me to offer my most sincere apologies. I simply wasn't thinking when I asked for you to come out in the weather like this."

"The weather is what it is, Governor. Neither of us can change it. I had to go out today, anyway, so whether I get wet now or later doesn't really matter."

Gracefully put, but I couldn't afford to put these people out. For all they knew, I was just another monster foisted off on them by an uncaring PSC.

"Carstairs."

"Yessir?"

"I find that I have been unkind and thoughtless. This poor woman is soaked and probably chilled to the bone. Would you be so kind as to bump up the temperature in here by a degree or two?"

"Certainly, sir. Would she also like a nip of Port to take the edge off of her chill?"

Excellent man, Carstairs. Behind that expressionless face was a mind that missed nothing. I glanced at the woman, a mute question. She nodded shyly.

"Yes, please, Carstairs. An excellent suggestion."

There was a background hum as the heat kicked in and moments later, Carstairs backed through the door with a polished silver tray bearing two cut glass tumblers and a matching decanter with a generous amount of Port in it. After the lady and I thanked him, he departed. I waited until I poured a bit and handed her the glass to get to the matter at hand.

"Mrs. Glasston, I've asked you here this morning to see if you can help me with a rather delicate matter."

"It's about the ghosts, isn't it, sir?"

So much for the tactful, subtle approach I'd planned on taking. "Well, yes it is."

"I've seen them, sir. Talked to them, too."

That was a bit more than I'd anticipated. "So there's more than one, I take it."

"Oh, yessir. Quite a few. Most everyone, I should think."

"Everyone?" I repeated, feeling somewhat foolish. Somehow, she was further along in the conversation than I was.

"It's the colonists, sir."

I took a deep breath before proceeding. "Mrs. Glasston, let's pretend that I know nothing about the ghosts. Tell me about the ghosts in your own words. Start from the beginning."

She took me literally. "Well, Governor, it's like this. Whirter . . . Governor Whirter, that is, was after my husband from the very beginning. It's as though he took one look at him and said, 'I shall do everything in my power to make that man unhappy.' And that's exactly what he did."

She went on in this vein for several minutes, but I sensed that she needed to come to the point in her own way. I was afraid that if I interrupted the flow of words, she'd lose the rhythm and I'd have great difficulty getting the information I sought. So I composed myself and listened to the details of Silas Whirter's descent into madness, of how he persecuted those whom he imagined to be in league against him, and the events leading up to the infamous massacre.

She was saying, "I came home that afternoon to find Jack gone. I didn't really

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think anything about it at first. I mean, he was often working more than he had to. It wasn't until it started getting near dark that I began to worry. Ella McCarty—I called her—her husband wasn't home, either. About that same time, Simon up and says his wife, Bethany, is gone. Finally, we realized that the ones who were missing were the ones who'd gone up the mountain to meet with Whirter. And that put us in mind to go see what they were doing up there and what time they were planning on coming home. We . . . well, we didn't know."

Her voice was a naturally soft one, but it had kept decreasing in volume as she spoke. At this point, she stalled out altogether. "And so you found them," I prompted. "What happened next?"

She swallowed visibly. "We went looking for Whirter. He was home eating his dinner as though he hadn't a concern in the world. By candlelight, if you can believe it."

I didn't need to ask what happened next. Whirter, in a cheerful tone of voice, had informed them that he'd killed the unfortunate people on Henson's Step, and that they'd be much better off without those pesky troublemakers. He'd then snatched a table knife and lunged at the nearest person. He'd been killed on the spot.

She sighed. "The ghosts. It's the ghosts you're wanting to know about. I know, but it all ties in, you see."

"How?"

She took a bit of her Port. "Well, it's like this. There's something about the Step that's like a magnet. If that cliff could speak, it'd have terrible tales to tell, but it stands mute and the horror gets under your skin and you can't get shut of it. But you can't go home, either, even though you want to more than anything in the world, because this is the last place that your husband was alive and the air is charged with his last breath."

"So you've visited the . . . site?" I asked. I'm not sure I would have done so, had I been in her shoes, but then perhaps she was correct in saying that you couldn't *not* do so. I hoped that I never had to find out for myself just how strong the pull of a murdered loved one was.

She nodded, looking down at the tumbler held in both hands. Her hands slowly dropped until they were resting, still holding the tumbler, in her lap. "I went."

"And saw a ghost?"

She shook her head, still looking down. "Not at first. I *heard* him."

"Your husband?"

"Jack," she said quietly, nodding slowly to herself.

I hadn't had any Port yet. I'd poured a drop for myself just to complete the tableau for Mrs. Glasston's benefit. Now I took a sip, thinking about how to proceed. "So, at first you heard him, but later you saw him?"

"Yessir. He was . . . he was there."

"Could you talk to him?"

"Oh, yes, and he'd talk back. Not out loud, but in my head sort of."

"I—"

"But there's something wrong with him. It's like he's gone simple-minded. He knows me, sort of. And he remembers things, mostly. But he's just not the same. I don't know which is worse, the idea that he's dead and gone, or that he's still here, but scrambled up in the head, somehow. I want to go home to Earth. If I stay here, I'll go mad . . . I know I will. It's just awful with him being like that. If he were normal, it might be a comfort to talk to him, but the way it is I just can't take it." She looked up at me with unshed tears in her eyes. "Please send me home! *Please!*"

There wasn't much more to be had from poor Mrs. Glasston. She finished her Port and left, leaving me to try to sort out her tale of ghosts who weren't themselves. She had said that others said pretty much the same things about their loved ones. They were as they had been in life, yet . . . not.

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So Jacoby wasn't alone in his assertion that there were ghosts. Now I knew more, and yet less. Mrs. Glasston had raised at least as many questions as she'd answered. I knew I was going about this all wrong, but it's not the sort of thing they train you for and I had no choice but to blunder through blindly.

Unfortunately, my personal feelings were all oriented the other way—that there were no such things as ghosts. And that led me to an internal conflict. I knew I should remain neutral until I had sufficient facts to allow me to draw a proper, objective conclusion, yet neutrality was not coming easily for me.

I interviewed two more colonists, but learned little that I hadn't already heard from Mrs. Glasston. They were unanimous in asking to go back to Earth, though. I could see my problems multiplying. It cost money to send colonists back and forth. Though they were within their rights to ask to go home, to send any significant portion of the survivors back to Earth and replace them with new people would only add to the red ink. That's assuming new colonists could be found who didn't mind sharing the planet with the ghosts of the dead. A pretty problem.

On my way home that afternoon, I stopped at Carstairs's desk. He looked up with a mildly quizzical expression. "Sir?"

"Carstairs, have you ever seen a ghost?"

"No, sir."

"Do you know anyone . . . anyone reputable, that is, who has seen a ghost?"

He shook his head slightly. "No, sir."

"Do you have any reason to believe that such a thing *might* exist?"

He pursed his lips. "Speaking loosely, sir, I might say that if you believed in the existence of a soul, meaning a life force distinct from the physical body, then perhaps that soul might be able to exist independently. Maybe. But that just raises more questions. Like this—energy cannot simply *exist*. It has to come from somewhere, and it has to go somewhere, simply as a matter of thermodynamics, if you follow me."

I nodded. "Energy can neither be created nor destroyed. Energy goes from a place where there is more of it to a place where there is less of it. That sort of thing."

"Exactly, sir. So I have to ask myself . . . this talking to people thing . . . it requires the expenditure of energy, right? Where's that energy coming from? If this spirit was still in a body, it could derive its energy from the body, which was eating and then metabolizing the food and so forth, but if it's off on its own, it's cut off from its source of energy." He frowned. "So I guess what I'm saying is, ghosts can't exist."

"Purely as a matter of thermodynamics."

"Right, sir. It'd be like keeping a lightning bolt in a jar. The lightning begins, ends, and is gone. Its energy was derived from the static charge between the cloud and the ground, but it's only a temporary phenomenon. You can't expect it to stick around, just because you want it to."

I nodded thoughtfully. "Thank you, Carstairs. You've been very helpful."

There's nothing like a horse. For some reason, people assume that colonists still use all the latest technological hardware when founding a colony, including transportation. They tried that, but it didn't take long before they changed their tune. When spare parts have to come all the way from Earth at great expense, it becomes prohibitive. Horses are self-fueling, self-repairing within limits, and most importantly, self-replacing. Send enough horses to avoid inbreeding and most local travel is taken care of.

My horse was named Ben. He and I saw eye-to-eye on most things. When we didn't . . . well, let's just say that I'd learned to take Ben's word for it after he'd balked at crossing an innocent-look-

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ing piece of slightly damp ground not long after I'd arrived. I had prevailed in our contest of wills, but paid a dear price. It turned out that we sank up to our hips and had the very devil of a time getting back out. He had his areas of expertise and I had mine, and I deferred to him in matters of transportation. The fact that Ben was making slower progress going up the mountain than I might have wished was irrelevant. He was in charge for the moment.

The mountainside was sparsely covered with trees—at least they looked very similar to Earthly trees. The ground was covered with a short, coarse, yellow-green plant not unlike some grasses back on Earth. Low cloud cover draped us in fog at intervals, more often as we gained altitude, often causing the terrain around us to disappear for a minute or two at a time. Faced with such weather, the imagination almost demanded ghosts.

Cashews were everywhere. That wasn't their formal name, of course. The scientists had burdened them with some tongue-tangling Latin label that no one could ever remember. However, their tendency to make a thrice-repeated call like a sneeze had struck early colonists as comical and for a while they'd gone around mocking the little alien creatures by saying *cashew-cashew-cashew*, after which some wag would say "Bless you" or "Geshundheit" or something of that nature. Inevitably, the name stuck.

Large, widely spaced, intelligent brown eyes peered at me from just over the top of a granite outcrop the size of a house. The eyes were set in a flat, round face the size of a large grapefruit. Never blinking, never straying. Ben seemed, for his part, not to even notice them, but Jacoby's horse was beginning to act a bit skittish, making little sideways dancing steps every so often as though shying away from something. Actually, I thought it more likely that it was Jacoby who was developing the jitters and his mount was merely picking up on his mood. Given that Jacoby felt that he was riding to meet ghosts, perhaps he was justified in his apprehensions.

Our destination was the execution site. If ever there had been people with the right to become ghosts, the butchered colonists of Bounty qualified.

A short ways northwest of the saddle between Lawsen's Peak and Humpback Mountain, there was a literal notch out of the flank of Lawsen's. The steadily rising slope suddenly flattened, creating an utterly level semicircular floor culminating in a smooth, nearly vertical wall of dark granite that stood as much as ten meters over the floor of the notch in places. Above the notch, the mountainside resumed its climb, eventually cresting at the Peak another five hundred meters or so above us. The notch had, in due course, been named Henson's Step, after the man who had found it, and that would have been that, had not the original governor lost his mind and committed an atrocity at the place. Now it was infamous across all of human space, images having been broadcast far and wide after the story broke.

When we arrived at the execution site, I dismounted and tied Ben to a tree. I'd been there before, of course. Had to, in the process of investigating the massacre. We were all conscious of the fact that we were making history, or at least sweeping the stage after the fact. Scholars and historians would be evaluating our every move for as long as the human race lived. Not only would Silas Whirter's actions be debated, but ours as well. I didn't relish the idea of being second-guessed for the next two or three centuries, but I'd been tapped for the job of putting spirit back into a broken people.

Speaking of spirits . . .

"All right, Jacoby. We're here. What do I need to see in order to judge the existence of these ghosts?"

Perhaps it came out a bit more brusquely than I'd intended, for he

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turned and gave me a stricken look. "Begging your pardon, sir, but I'd rather that you not speak of judging the dead . . . seeing as how they may well be here to judge us."

Again, had it been anyone but Jacoby, I'd have dispensed with such talk quickly, but stolid as he was, I had promised myself to take the man at his word. I nodded. "Very well, then. I am at your disposal. Tell me what to do."

His lips compressed as his eyes strayed to the fog close around us. "Nothing, sir. Just be quiet and let them come to you."

"All right, Jacoby. May I walk around, or should I stand right here?"

He gestured nervously with one hand. "Walk around if you like. I shouldn't think it would matter, sir."

I nodded and went to the lip of the notch, looking back down the way we'd come. Though the level floor of Henson's Step was entirely devoid of trees, they grew right to the edge of the cut. The view down-slope consisted of tree trunks flitting in and out of the mist. Moody, unquestionably, but hardly the same thing as seeing the spirits of the dead. I was mildly bothered by the fact that I hadn't noticed any ghosts when I'd been here before. On the other hand, I hadn't thought to look.

I turned and walked to the granite wall where Whirter had stood his victims in a line, their hands tied behind them, and each person tied to the next one in line. There were chips missing from the granite. The fresh surface was lighter in color than the weathered stone and showed just what a poor marksman Whirter had been. And from less than ten paces. It was estimated that over a third of his shots had gone wild, missing their marks entirely. Even before we'd gotten to Bounty, the survivors had pieced together how Whirter had tricked the unsuspecting colonists up the mountain, drugged them with a crowd control fogger from emergency stores to render them temporarily defenseless, tied them up, then stood them against the wall prior to getting out his gun.

Silas Whirter's body had been exhumed from its crude grave and sent back to Earth for extensive testing. Had he fallen prey to a chemical imbalance? Had he had an undiagnosed brain tumor? Had he had a tormented childhood that had escaped the attention of the psych evaluation board back on Earth before he was chosen to be the governor of Bounty? No one knew. He'd accused the colonists of conspiring against him, but there was no evidence to support it. According to all available notes, diaries, and files, including Whirter's own, his feelings were entirely due to unjustified paranoia. Frankly, I doubted whether definitive answers would ever be found, but there's always the oh-so-human tendency to demand that someone *do* something, even if it's pointless. *Particularly* if it's pointless.

And to think that the Planetary Settlement Commission had sent them to their doom, telling them to put their trust in this man. Not our finest hour, to be sure.

I felt eyes upon me and turned in a slow, measured way to see what manner of spirit they might belong to. A Cashew. I should have guessed. I confess to a certain feeling of relief on seeing such a small, unprepossessing creature. Slowly, the animal crabbed sideways across the ground. At first glance, a Cashew might be taken for one of the smaller Earthly primates. They had six limbs, though; two up top and four rear legs, and their bodies were very wide and flat. They could balance well on the rear legs and were frequently seen with their front halves reared up into the air so they could see. I'd never really paid much attention to them.

I frowned. Could—

Jacoby called out, "Sir! Sir! Look!"

He was at the rim of the notch facing outwards, but he wasn't pointing down the slope as I might have expected. His

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arm was aimed towards the wisps of fog that slipped in and out of the leaves in the trees... and damned if there wasn't, well, a face of sorts. Two dark leaves for eyes, fog for a damp brow, and the rest of the face poorly formed by gathering shreds of cloud. I would have passed it off as mere chance that those elements should come together in such a manner as to make a recognizable human face, but the visage did the most remarkable thing. It lifted off the tree and came towards us. In doing so, it lost the dark pupils as the leaves were left behind, but the rest of the face gained definition to compensate. It was clearly, unmistakably, a human face. A woman's face.

Jacoby broke and ran for his horse, whimpering. He tore the reins loose from the tree, and was gone, galloping hell-for-leather down the mountain heedless of safety for himself or his mount.

Leaving me to face the ghost alone.

I rode slowly back into town, keeping an eye out for Jacoby and his horse. The only evidence of their passage I'd seen was a large scuffed place that I judged to be where he and his horse had fallen in their headlong flight down the flank of Lawsen's Peak. The idea belatedly occurred to me that he might have been "taken" in some sense by the spirits, but even in my preoccupied state, I wasn't sure I believed it.

Having no better plan, I went back to my office. Nicholas Carstairs looked up as I came though the door, damp from the mists of the mountain. As usual, no emotion showed, but he did rise from behind his desk and took my cloak from my shoulders most solicitously. Then he guided me to the chair in my office.

"Sir," Carstairs began, "can I get you something?"

I started to wave him off, then thought better of it. "Yes, I suppose so. And check on Jacoby if you would be so kind. We were separated coming down the mountain and I'd like to be sure that he made it back safely."

He straightened from getting me seated and stood there regarding me steadily for a moment or two. "Yes, sir," he said finally, and left the room. In another minute he was back with a tumbler three-quarters full of some of our best Port. This, he placed at my elbow. As he left the room, he gave me another searching glance before closing the door, leaving me to contemplate mortality and immortality in privacy.

The next morning, Willard Jacoby was before my desk staring at the floor. The extent of his personal humiliation was obvious. He'd come to apologize for abandoning me at Henson's Step. He made no excuses and seemed prepared to accept any punishment that I might mete out without complaint.

I looked at the cast on his left arm and the cuts and bruises he'd sustained coming down the mountain. "Jacoby, I have but one thing to say to you," I said, perhaps a bit more sternly than I'd intended, but the words had their own force and came out with a sort of internal momentum.

"Yessir. I know that I failed you in more ways than one," he said miserably.

I shook my head and sighed. My fault. I'd begun the conversation more severely than I'd intended. If I couldn't get the military contingent to stand by me, then all was lost; there was no hope that the colonists would stay the course in the face of such a vote of no confidence. "Jacoby, what I'd like to say is that I'd have done the same if I were in your shoes."

That confused him. His brows knit, unknit, then wrinkled again as he tried to work his way through that admission. "But, sir—"

I held up a hand to stop him. "I know, I know... you joined the military with the intent that you would put yourself in harm's way. You vowed to protect the civilian populace from threats to their safety. Then, faced with the ghost at Henson's Step, you... well, you staged a

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retreat, leaving a civilian unprotected in the face of potential danger. On the face of it, that looks bad. But let me suggest another perspective. The first point is that I didn't come to harm. The second is that there's no reason to believe that any of your training would have, in fact, done any good had that ghost meant to hurt me. No hand-to-hand combat skills, no gun, not even the knife in your boot sheath. It was just a face formed of fog. In fact, your retreat may have been the best thing that you could have done. Had we actually been faced with an insurmountable foe, the most useful thing you could have done was survive to warn the colony."

Having pushed the limits of rationalization, I let him digest what I'd said in silence. Finally, he straightened and looked me in the eye. "But everyone knows—"

"Nothing," I finished for him. "Absolutely nothing. I asked Carstairs to make sure that you were safe when I got in. All I told him was that you and I got separated coming down the mountain. No more than that."

Jacoby looked down at his left arm and smiled wryly. "Broke my arm, sir, when I and my horse took a tumble. But if that's the worst of it, then perhaps all will turn out for the best." Then his face clouded once more. "Still, sir . . . there are *ghosts* on that mountain!"

I shook my head. "I don't think so, Jacoby. I believe that we are in the presence of the physical, not the metaphysical, when we see those 'ghosts.'"

He blinked. "They aren't real, then? Then what—"

I shook my head. "Oh no, they're quite real in their own way. But I think that we'll find that the true explanation lies behind the soulful brown eyes of the Cashews."

That set him back. "The *Cashews*, sir? Now I feel doubly a fool. If I can't stand up to a little thing the size of a dog, then I'm truly a coward."

I allowed myself a chuckle. "I don't believe that there's any reason to fear Cashews, Jacoby. They don't mean any harm."

His eyes opened wide. "No harm, sir? Why, they scared me half out of my wits! Broke my arm, in the bargain."

"Now, Jacoby, your arm wouldn't have gotten broken if you hadn't been in such a hurry to leave."

He heaved a guilty sigh for that one. "Right, sir. I suppose I'll have to take the blame, there."

"And as for being afraid, it's only a question of understanding what you're seeing."

He paused. "Yessir. I'm ready to go back up the mountain, sir, if you need me. This time I won't run. Promise."

I believed him. "No, I'll need you here before all's said and done. We still have to convince the colonists. *That* will take some doing. Besides, your arm is broken, and I'd like to let you mend a bit before you and I go talk to the ghosts again." I gave him my most encouraging smile. "Go back to your barracks. Stick to light duty until your arm heals. I'll talk to your commanding officer if anything needs to be squared away."

Jacoby paused at the door on his way out. He turned and looked back at me with a face full of emotion. "Thank you, sir. I know what I deserved, and you were merciful. I know it and I won't forget it. Ever." Then he left.

"Carstairs, could I see you in here, please?"

His image nodded. "Yessir. I'll be right in."

As he came through the door, I asked him to close it behind him. His face betrayed nothing, but I sensed a stiffness there. He then came and stood before my desk. "Yessir?"

"Well, what do you think, Carstairs?"

A tiny twitch of one eyebrow. "Think, sir?"

I cleared my throat. "The telltale was on, Carstairs. You were listening while I spoke to Jacoby."

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Damned if the man didn't swallow hard. "Sorry, sir."

"I'm not asking you to be sorry, Carstairs, I'm asking you what you think. You carry the rank of captain, and you must have some opinion as to how men should be led." I paused, then added, "I know you'll be discrete and keep the boy's secret."

"What do I think, sir? What I think is that you now own Jacoby's soul. He will storm the gates of hell after this, if it's you who ask it." He took a deep breath. "It's not what I would have done. I would have wrung his neck. But that's why they made you governor, sir. You've got the touch, and I don't."

I stared him straight in the eye. "And you, Carstairs . . . will you storm the gates of hell with me?"

He blinked. "I don't understand, sir."

"I'm going back up that mountain, Carstairs. Will you come with me?"

"Back up the mountain, sir?"

I nodded. "In spite of what I told Jacoby, I don't quite have this all worked out. There are a few details I'd like to settle to my satisfaction."

He took a deep breath, the closest thing to fear I'd ever see Carstairs display. But then he gave me a snappy salute. "When do we leave, sir?"

What with one thing and another, it was getting late in the afternoon before we started up the mountain. The temperature had dropped since I'd been there earlier. I was watching the breath from Ben's nostrils form little jets of steam after the climb. Carstairs was watchful beside me, his eyes flitting everywhere. He was wary, but steady.

"I don't like this," Carstairs said quietly.

I nodded. "I know. But I think this is both the end and the beginning. If this works out the way I hope, we may be able to save the colony."

He glanced sharply at me. "It's as important as that?"

"I believe so."

He arched one eyebrow, but said nothing. I dismounted and led Ben to a tree off at the side of the cut. Behind me, Carstairs did likewise. We went and sat at the base of the granite wall.

"Now we wait for ghosts. Right, sir?" Carstairs guessed.

"Exactly."

With the wall at our backs, we had an unobstructed view of the entire floor of Henson's Step. There were freestanding stones about the size of tables to our right at the edge of the flat area. It was there that I saw the first Cashew.

I nudged Carstairs with my elbow.

"I see him, sir. Want me to take him out?"

I shook my head. "Not at all. In fact these little fellows are part of my plan to save the colony."

Carstairs pulled his hand back from his sidearm with great reluctance. "If you say so, sir." He didn't sound convinced.

Another Cashew scuttled sideways over the rim of the cut, coming from below. Not long afterwards, I heard scrabbling noises above us. I didn't look up, but Carstairs did. He caught my eye and nodded.

When there were five or six of them around us, I turned my attention from watching the Cashews to the trees. There were two faces forming that I was sure of, and another possible one. I tipped my head towards the nearest one.

Carstairs's keen eyes had already spotted a face, a different one. "So they're real," he whispered to me.

"One way or another, they're real, Carstairs," I answered quietly. "The way I see it, either the Cashews are telekinetic and able to form the fog into the semblance of a human face, or they're telepathic and they're able to make us *think* we're seeing a face."

He shook his head. "Better not be that last one, sir. If trouble breaks out, I don't want it to be against an enemy who can control what I think I'm seeing. They

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might make me think you were a Cashew. I could end up shooting you by mistake."

Honestly, I hadn't considered that possibility, but it was too late now. We were here and the Cashews were gathering. And so were the ghosts. I singled out the clearest face and stood.

"Sir . . ." Carstairs began.

"I'm all right, Carstairs."

"That's just what they'd make you say."

Had I made a strategic blunder? Was I under the control of the Cashews? Would I even know? I wasn't sure how to test such a thing. I began walking towards the face.

"Sir!" Carstairs scrambled to his feet behind me, scaring one of the Cashews off to the right. It scampered off into the mist. One of the faces in the trees wavered and vanished. If nothing else, it passed as circumstantial evidence that the Cashews were actually generating the faces.

"Sir!" Carstairs repeated, his voice full of concern.

Without turning, I waved him back. Ever so slowly, I crept towards the face I'd picked out. I carefully reached into my pocket and withdrew a small viewer. Thumbing the key, I tagged my way through ID pictures of the dead colonists. It was the fourteenth picture that matched.

I held the viewer behind me, still not turning. "His name was Steven Hascomb. A maintenance tech with the communications group."

Carstairs's footsteps came closer. He took the viewer. "It's a good likeness, sir, I'll say that."

"Steven," I called out.

"Yeah," the face said. Except that it didn't. The mouth didn't move.

"Are we hearing this, or do we just think we're hearing this?" Carstairs whispered.

"I have no idea. Switch on the mic on the viewer and see if the sound registers," I suggested. Then, louder, I said, "Steven, do you know who I am?"

"You're new," he said.

"Steven, I'd like to talk to the Cashew who's making you. Is that possible?"

What followed was one of the most startling sensations I've ever felt. Overlaid on my view of the face and the tree behind it, I saw my own body from behind and to my left. The effect disoriented me and I must have swayed.

"Sir!" came Carstairs's voice. "This is too dangerous. If there's really anything that needs to be said here, let someone else do it."

I shook my head. "No. If I can't deal with the Cashews, I have no right to ask others to do so."

The next few minutes were amazing, but ultimately futile. I could see through the Cashew's eyes and feel the cool, damp stone under its paws. All its senses were available to me, but I was unable to make sense of its thoughts. They went by too quickly and were so different from anything that I took for granted that by the time I was able to unravel one thought, the Cashew had gone on far ahead. Whether it would ever be possible to communicate directly with the Cashews, I couldn't guess, but I clearly wasn't going to manage it in one day.

"All right, Steven, I guess we'll have to do this the hard way. Let me speak to you again." As his face floated down towards me, I sat on the ground. It was going to take a while and I might as well get comfortable.

I started with Mrs. Glasston. She and I had already spoken about the ghosts and I was hoping that would give me a running start when I brought the subject up again. As before, she sat in front of my desk. I came around and took a seat next to her. Anything to make me more human and less of an authority figure.

"The ghosts again, isn't it, sir?" she said.

A running start, indeed. I nodded. "Yes, it is. You see, I've been up to Henson's Step. I've seen the ghosts. I've also

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spoken with them."

She looked dreadfully earnest. "Then you believe me, sir?"

"Of course. That was never seriously in question. But it did help for me to meet them personally."

She bit her lip, nodding. "Then what do you want from me, sir?"

"What if I told you that I've spoken with Jack and that he's agreed not to appear unless you want him to?"

She stared at me. "What?"

I took a deep breath. Best to get this part over with. "Well, Mrs. Glasston, they aren't really ghosts. Not in the sense that you or I think of ghosts."

"But I've *seen* him!" she insisted.

"You've seen your husband's face, but was it really a ghost? That's the question."

"But if he's not a ghost, then what is he?"

I still hadn't yet figured out a way to sugar-coat this part. "He's a Cashew now."

"He's a *what?*"

I hurried on. "The Cashews are telepathic. When your husband was up there on Henson's Step, he was afraid, angry, and worried about you—he was very emotional. The Cashews can read that sort of thing. They also have an instinctive need to record the minds of the dying. When the older members of their race die, they hand over their memories to a living Cashew. For them, it's an evolutionary adaptation—an efficient way to learn things quickly when they are young. Then we came along and they were faced with thoughts that they had trouble reading or understanding. But our emotions . . . *those* they could understand. When our colonists were dying up there on Henson's Step, the Cashews felt the urgent need to do something. Even though they didn't understand us, they understood death and fear and suffering and they tried to the best of their ability to make faithful recordings of the colonists who died."

"And being simple animals, they were bound to make simple copies, is that it?"

"There's more to it than that. I believe that there's more to the Cashews than we suspect. If the Cashews had understood your husband better, you might be able to talk with him now just as you would normally."

She was silent for a time. She shook her head. "I still don't think I can do it. Jack's ghost is just . . . it's too much to bear."

"There are two more things I need to tell you before you make a final decision. One is that the Cashews didn't understand that the ghosts upset people. To them it's as natural as sunrise. Now they understand that it's disturbing to some. The other thing is that they may be able to make more sense of your husband's memories as they learn more about us. It will take time and patience. We are very different from the Cashews and it will take a lot of work if this is to come to pass."

"So he's not a spirit come back from the dead," she said finally. "I don't know whether that's better or worse, but at least it's not as frightening."

"I'd like for you to stay, Mrs. Glasston. You're an experienced colonist. When new colonists arrive, perhaps you could guide them through the process of talking to a Cashew."

She gave me a wry smile. "And you think you've got me fooled. When it comes time for me to die, there'll be a Cashew looking in the window and the next thing I know, I'll be seeing though a Cashew's eyes."

I shrugged. "Perhaps so. But it might amount to a kind of immortality. Perhaps even a way to be with your husband."

She gave me a crinkled, bittersweet smile. "You're not playing fair, sir."

I smiled apologetically in return. "I know. Will you at least think about it, though?"

She gave me a small nod. "If there's a chance that it might help bring Jack back, I might stay. I'd feel disloyal if I left

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him in his current state, that's for sure."

What Mrs. Glasston needed now was time alone. The thought of her husband's ghost being "simple-minded" had been a raw spot on her emotions. Now perhaps she could face his residual persona—call it a ghost for want of a better term—and not feel that he was less than he should be. If she could win that battle, I'd have an ally in the fight to save the colony.

I stood watching Mrs. Glasston through the window as she made her way down the street. Carstairs entered the room behind me. "You didn't mention the possibility that she'll fall in love and remarry. If that happens, her feelings for her husband will likely fade over the years."

I should have chastised him for listening in again, but it didn't really matter. "Maybe. Maybe not. If he's up there on Henson's Step, he may stay fresh in her mind. We'll all have to adjust to this if we're to stay here."

"Do you really think it's possible that her husband could come back more fully, sir?"

Mrs. Glasston had turned a corner. I turned to face Carstairs. "Honestly, I don't know. But it's worth a try. At least that's the way I'm going to present it to the Planetary Settlement Commission."

His brow furrowed a bit at that. "I'm not sure I understand, sir."

I allowed myself a slight smile. "I haven't forgotten that we have a report to write. One that portrays Bounty in a positive light."

The furrow in his brow increased by a tiny increment. "Yessir, we do, but I don't see how the one relates to the other."

I smiled a little more widely, enjoying his increasing perplexity. "Our job—yours and mine—is to repair the damage that Silas Whirter did when he murdered those poor colonists. And, as we both know, there's nothing really wrong with the colony. The planet is a fine one. The climate is good. The colonists themselves are good people. It's just that it's acquired this rather unfortunate reputation. Am I not correct?"

"Well, yessir, of course you're correct, but—"

"So all we need now is a little sweetener to make Whirter's memory less oppressive, yes?"

I had him now. He was nearly to the point of displaying what in a lesser man would be a complete facial expression. "Yessir."

And now, to give the poor man his release, I said, "Then what, my good Carstairs, could be better than to let the people of Earth know that we have found immortality? Will they not be clamoring to immigrate to Bounty?"

And I will swear a solemn oath that young Carstairs's mouth fell open. Just for a moment, it's true, but long enough for all that. "Why, sir, my hat is off to you. I do believe you've just solved two problems at once."

"Thank you, Carstairs. Coming from you, that's high praise."

But then he had his little revenge for my stringing him along. With a sly grin he said, "And just when I thought you were ready to give up the ghost, sir."■

There are no uninteresting things, only uninteresting people.

—G. K. Chesterton

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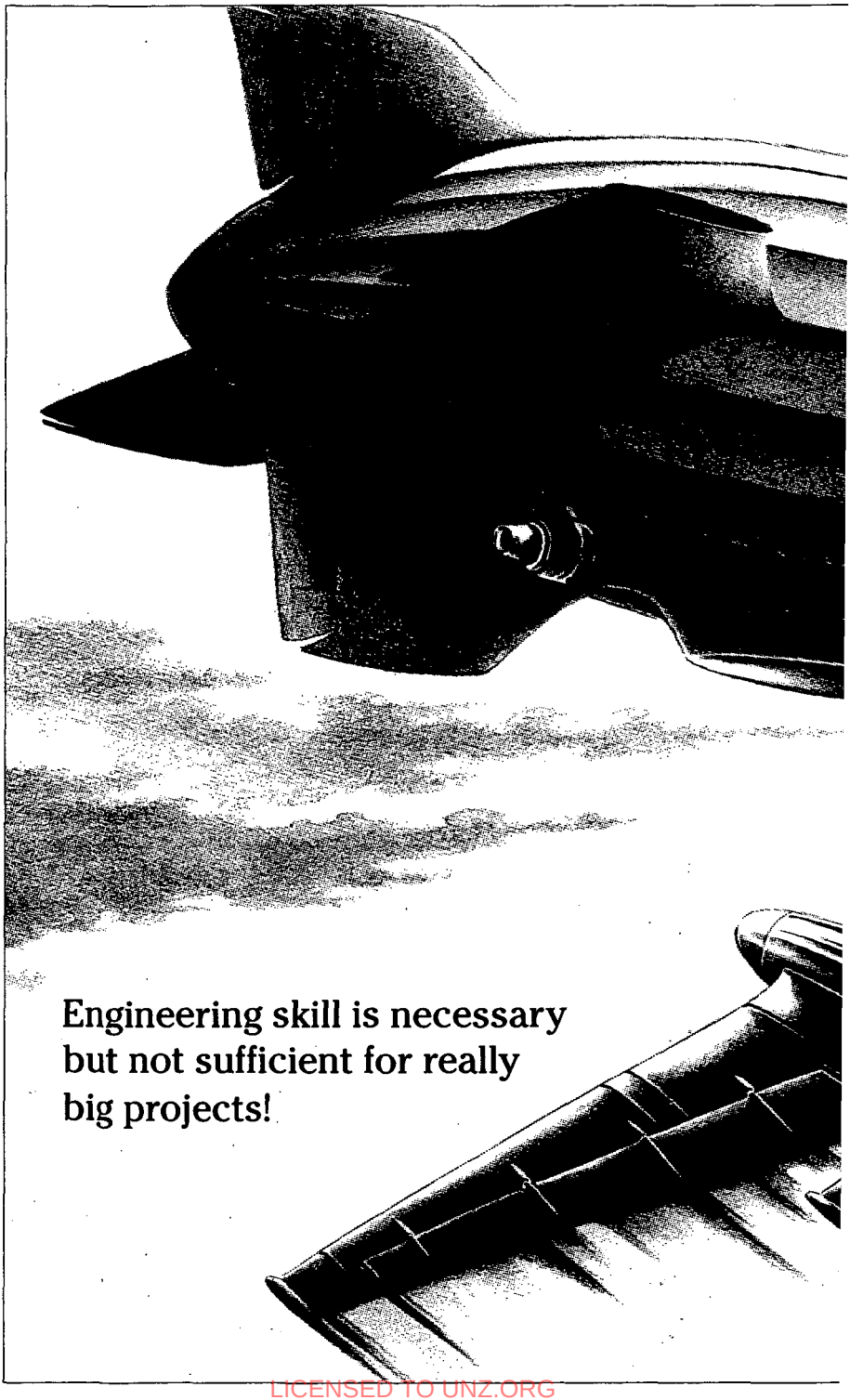

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RESONANCE

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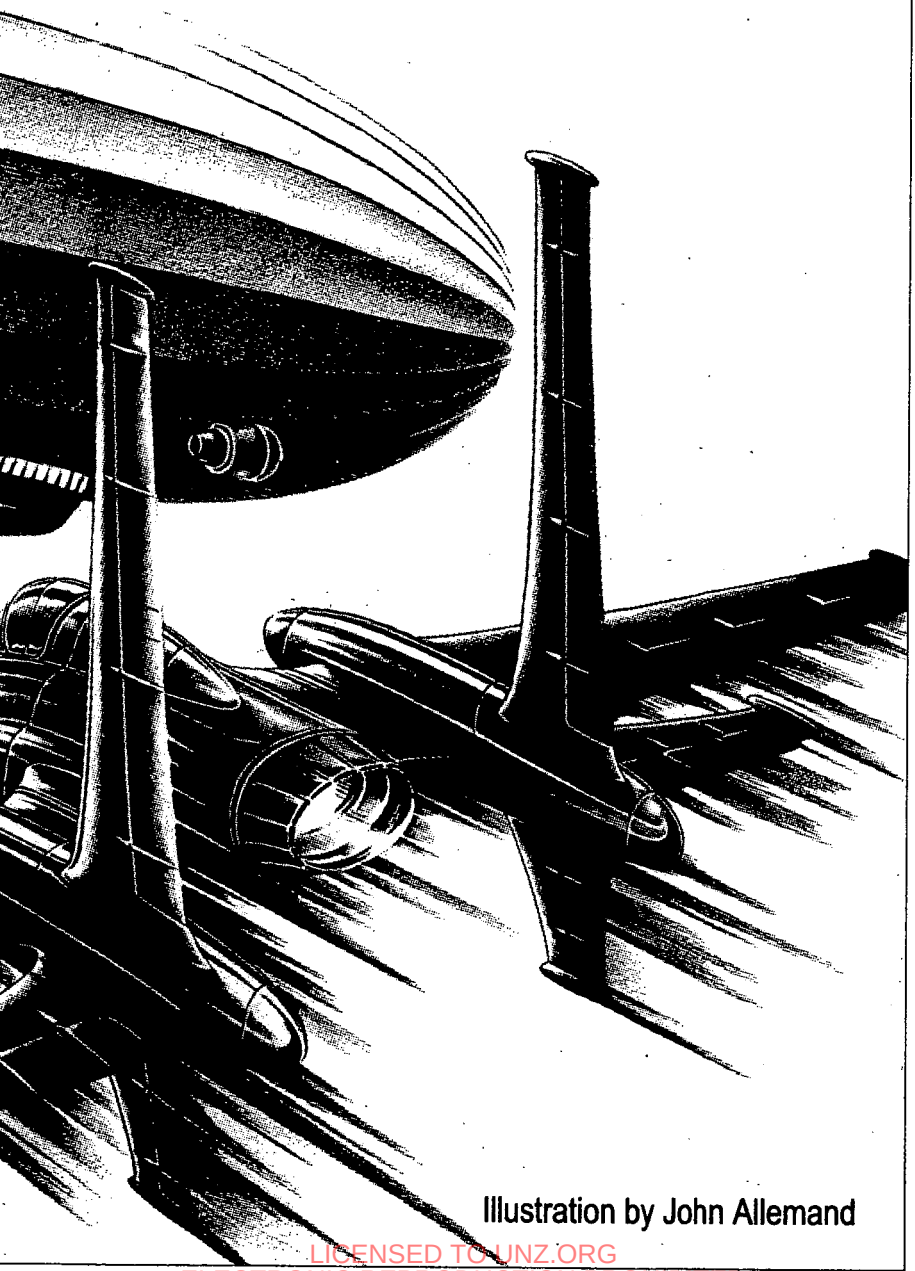

Illustration by John Allemand

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Grant Sullivan watched his dream slipping away on CNN. The screen showed a competitor's spool carrier approaching the massive steel and concrete base to which it was meant to attach. A thin black line emerged from the top of the carrier: a ribbon of nanofiber reaching up thirty-five thousand kilometers to NanoSpacial's station in geosynchronous orbit, then stretching even farther to a massive counterweight.

As the ribbon unspooled, the carrier moved closer to the ground, until it touched down. Various locking mechanisms clanked as they attached the cable firmly to the elevator base. A cheer went up from the crowd at the NanoSpacial site near Quito, Ecuador.

He had known Nano was close to finishing their space elevator, but not how close. His own company's cable—the Sullivan SpaceLifter—still had over two thousand kilometers left to go before it touched down near the Brazilian city of Santana. That would take at least a month, and by then it would be too late.

Grant muted the television as Juan-Carlos Killeen, NanoSpacial's CEO, attached a small wheeled climber to the strip. It would travel up the strip, streaming a second strand behind it. Others would follow, and soon there would be a thick cable capable of carrying any payload into space. But that first climber was the important one, because once it reached the top, NanoSpacial could claim the quarter-billion-dollar Otis Prize for creating the first space elevator. It would complete that climb in less than three weeks, and there was no way Sullivan Space Technologies could catch up.

The Sullivan SpaceLifter would get finished, of course, because it was the only way to recoup the money spent on development. But Grant had been counting on winning the Otis Prize, and without that money he would certainly lose control of the company he had founded, even if it did manage to stay in business.

He sighed and switched off the television. Fighting back the disappointment that seemed to swell in his throat, he swiveled his chair so he could look out of his office at the Houston skyline as he pondered his options. This was not something straightforward like the engineering problems he'd had to overcome fifteen years ago to win the race for the first electromagnetic mass-driver orbital launch system. Over the last few years he'd been forced to become less of an engineer and more of a businessman.

Maybe he could convince his lenders to restructure some of the loans. That might delay things enough to allow the SpaceLifter to become operational and start showing a return on investment. He'd chosen Santana, Brazil, for the anchor point of the SpaceLifter because it had a port on the Amazon, which allowed cargo intended for space to be sent to the base of the elevator by ship. That should make the SpaceLifter more attractive for heavy cargo than NanoSpacial's elevator in Quito.

Of course, if NanoSpacial had beaten him by less than the 2.7 kilometers of Quito's elevation, he would now be cursing himself for not having chosen a mountain site. But over the long term, he was sure Brazil was the right choice.

Turning to his computer, he told it to send a message of congratulations and a case of Dom Perignon 2018 to the NanoSpacial CEO. The cost was negligible compared to Sullivan's debt, and having lost the race, he thought it wouldn't hurt to be friendly. After all, he might end up looking for a job if he lost control of his company.

He started going over the financials, and was deeply engrossed in calculating the effect of possible revenue streams on the company's cash flow when Willy Horst, project manager for the SpaceLifter, rang through on the dedicated line. "Grant, what do you think it is?"

"What do I think what is?"

"You're not watching Nano's elevator?"

"I turned it off after they connected."

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"Turn it on, quick."

He turned the screen back on. There was a small frame down in the corner that still showed the scene from Ecuador, but the main picture was jerky footage from inside a space habitat. Grant thumbed up the volume so he could hear.

"—really shaking us about and it seems to be getting worse." The astronaut's voice was calm through the bursts of static. The caption on-screen labeled the feed as "Live from NanoSpacial Geo-Station." That was their elevator terminal in geosynchronous orbit. Sullivan had something similar over Brazil, still lowering its nanofiber cable toward Earth.

"When did this start?" he asked Willy.

"Not sure. They cut to that feed just a couple minutes ago. Something's happening groundside, too."

"Earthquake, maybe, and the shock is getting carried up the line?"

"No, the people are standing around the base without any problems. But the base itself seems to be shifting up and down by a few centimeters."

The base must consist of over a hundred tons of concrete and steel. It couldn't be shifting like that, but in looking at the small picture on the screen, Grant saw that it was. "Their cable can't possibly be strong enough to pull that base up."

"Yeah, that's what I thought, too."

Then he realized what it must be. "Tacoma Narrows."

Willy sharply sucked in a breath.

In 1940, a suspension bridge across the Tacoma Narrows in Puget Sound had begun vibrating due to high winds. The vibration continued to increase and the sections of the bridge began swinging wildly and buckling, until finally the bridge collapsed. All of this was caught on film, so it had become the physics-textbook example of resonance. And it was every engineer's nightmare.

Theoretically, intelligent shock-absorber systems in the base of NanoSpacial's elevator should have compensated for any vibration, preventing the vibrations from building up through resonance. But if the shock absorbers were mistiming their adjustments, then instead of damping out the vibration they would actually increase it through a feedback loop.

One of the astronauts was bleeding now, having banged his head against the station wall as it jerked about.

Grant frowned. "Unless Nano can get things under control, those guys up there are going to get beaten . . ." The private-sector space business was competitive, but nobody liked to see astronauts hurt, no matter which company they worked for.

And then the picture from space went completely steady. One of the astronauts said, "It's stopped."

Willy sighed in relief. "Well, I guess they fixed it."

"No. If they'd fixed it, it would have gradually died down. Nano's cable snapped." The movement of the counterweight at the far end of the cable must have stressed it far beyond its designed load.

"Yes!" Willy's voice was exultant. "We're back in the game."

Grant, too, had felt a fleeting joy before realizing what was about to happen. When a tight rubber band snaps, the ends have to go somewhere. And when that rubber band is thousands of kilometers long and razor-sharp on its edges, there's no good place for them to go.

Three weeks later, the Brazilian government rescinded the permits for the SpaceLifter to connect in Santana. Quito had been lucky: the break in NanoSpacial's cable had been fairly low, so only about 10 percent of it had fallen to the ground. The writhing coils of nanofiber had killed twenty-six people and wounded about two hundred more, a lot less than Grant had feared, but it was more than enough to change some very

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important people's minds.

The Sullivan SpaceLifter wasn't the only space elevator project that had run into difficulty after the NanoSpacial disaster. Indonesia had halted the joint Mitsubishi/Hyundai elevator under construction near Samainda, and the Kenyan legislature was on the verge of passing a bill to stop construction of the British Spaceways elevator. Only Industrie Olympiae seemed to be proceeding without trouble, perhaps because the government of Gabon was mindful of the French navy's sudden decision to hold live-fire exercises off the coast of Libreville.

But Grant refused to call it quits yet. As he saw it, the fewer competitors there were, the more likely Sullivan Space Technologies could win that quarter-billion. It just needed some creative thinking, so he'd scheduled a conference call to do some brainstorming with the company executives and top engineers involved in the elevator project.

"Any chance the government will reconsider?" he asked the company liaison in Brasilia. "We've already poured an awful lot of money into their economy, but that's peanuts compared to what they'd make off taxing traffic through the elevator."

"I don't think so, Mr. Sullivan. There were organized street protests against —forgive me —'Yankee imperialists who don't care about the lives of common people.' I've been told that if our elevator is as safe as we claim, why aren't we building it in the U.S.?"

"And you explained that it has to be at the equator?"

"Yes, but the science doesn't matter to them; the politics does. Maybe after the next election we could work something out, but that's a couple of years off. Until then, they're not going to budge."

That confirmed what an international political consultant had told Grant. "So Brazil's out. What alternative countries are there? Maybe something in Africa?" Moving the orbital position of the elevator would be time-consuming, but it could be done.

Yocasta Rinfield, the company's international law specialist, said, "I'm afraid we have a major problem, even if we find another country willing to let us base the elevator. Right now, as I understand it, the bottom of the elevator is only about seven kilometers up?"

"Yes." The cable could already have reached the ground if it had been traveling at its previous speed of about four kilometers per hour. But now that the spool carrier was in the atmosphere, they had to move more carefully. The last seven kilometers would take as much time as the previous five hundred.

"That's low enough that it is considered to be in the airspace of whatever country it's over; Brazil, at the moment. So, to move it will require permission from any country it passes over. Traveling west, we run into Colombia's airspace. They won't let us base there, but they might let us pass through. But then we hit Ecuador's airspace. We'll *never* get permission there. Traveling east, we'll run into Gabon's airspace before we can get to any other African countries, and I don't think Gabon will cooperate in setting up competition for their own elevator."

Nobody said anything for several seconds.

Finally, Grant said, "Is it possible Brazil would let us build the base away from any inhabited area, if there is such a place?"

"Oh!" exclaimed Willy. "I'm a half-wit. Forget Brazil, or any other government. Forget *land*. There are thousands of miles of ocean along the equator. We originally considered an ocean platform as an option, but rejected it because both initial cost and maintenance were higher. But now . . ."

"How much more?" Grant asked. He had stayed up well into the night trying to figure out how to pay for the construction of a minimal new base; the company was so deeply in the red that

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additional loans were out of the question. By delaying payments to some suppliers and selling future satellite time to current customers at a huge discount for advance payment, he thought he had found enough money. And even that required liquidating his personal stock portfolio.

"About 30 percent more initially, and 50 percent more for maintenance."

It was too much. "Any way we could reduce that difference for a minimal system?"

"I don't know. The costs of constructing a floating base will be more, no matter what. So I don't—just a minute." There was a muffled sound of a brief conversation, and then Willy came back on the line. "One of my people here suggests we lease a large freighter for now, and build our own platform later. I think it could work, and it would require less up-front investment."

Grant slapped his desk. "That's why this company was first with the mass driver, and why we'll be first with a space elevator. It's my secret formula for success: Hire smart people and trust them to come up with solutions. Get cracking on this, Willy. You make sure it can work on the engineering end, and I'll find a way to make it work financially."

Several days later, Grant received a surprise visit from NanoSpacial CEO Juan-Carlos Killeen. Grant offered him a seat, but he declined.

Instead he walked over to the window and gazed out at the streets of Houston. "Do you know what made our cable snap?"

"Looked like a resonance problem. Something was vibrating at the natural frequency of the cable, and . . ." The engineer's natural instinct to explain a problem made Grant start to answer before he realized that Killeen probably wasn't talking about the engineering cause.

"It was sabotage. That's what made our cable snap. Sabotage."

"I promise we had nothing to do with it. I would never condone—"

Killeen turned back and looked at Grant. "I'm not accusing you of anything. We caught the guy who did it: one of our programmers. One of our own people; been with us for ten years. He booby-trapped the shock absorber programming. No, I know you weren't behind it. I'm here to warn you."

"Warn me?"

"We turned him over to the Ecuadorian police. We did not think they would be too gentle with him after what happened. But he suicided on the way to the police station."

"Suicided?" That didn't sound like normal procedure for industrial spies. If they got caught, usually they would make a deal by ratting out their employer. "Are you sure he wasn't killed by whoever hired him?"

"Suicide pill hidden in his tooth. They found the remains of it. But we've checked his background, and we know who was behind him. The news is being kept quiet so law enforcement can try to track down his accomplices, but I thought I should give you a heads up: It was Gaia Jihad."

Grant felt an emptiness at the base of his stomach. Near the beginning of the century, international politics had made strange bedfellows out of radical Islamists and extreme environmentalists. Gaia Jihad was the bastard child of that union.

Fusing the rhetoric of radical environmentalists with a brand of Islam that was condemned as heretical by mainstream Muslim leaders, the group began by attacking oil industry targets in Saudi Arabia. True Islam had been corrupted, they claimed, by the wealth that came from raping Mother Earth.

By 2016, Gaia Jihad had succeeded in halving Saudi oil exports through a steady stream of suicide bombings targeting wells, pipelines and shipping. They began to branch out: hitting car manufacturers, large-scale agribusiness,

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and other targets that they claimed represented the "corrupting" influence of technology on the Earth.

Until now they had not directly attacked space-tech targets, possibly because they had fewer objections to the corrupting of space. But the attack on the NanoSpacial elevator meant that the SpaceLifter was also a target, and Grant wondered if one or more of his employees were planning something similar.

"I'll have my security start looking into possible threats." Grant paused. "Thanks for the heads-up."

Killeen nodded, but seemed lost in thought.

After a few moments, Grant asked, "Was there something else?"

"We still have 90 percent of our elevator, but no place to base it. I've heard rumors that you're working on a new base somewhere." He sighed. "Unless we complete our elevator, NanoSpacial may go into bankruptcy. I know we're competitors, but ... Look, there's no way we're going to catch you now for the Otis Prize, unless something happens. But what if something does happen? If you're in the financial squeeze I think you are, you need that prize money worse than we do."

Grant didn't bother saying that the financial squeeze was probably worse than Killeen thought. But he wondered where this was going, so he just nodded his head.

Killeen became more enthusiastic. "Long term, there's more than enough business for both our elevators even if they're side by side. So, if you can help us get a base, and something happens to slow your construction so that my company ends up winning the prize, we'll split the money with you, fifty-fifty."

Leaning back in his chair, Grant could not see anything wrong with Killeen's proposal. From a business standpoint, his company couldn't lose. Of course, Killeen had to be thinking that Sullivan Space Technologies had secretly found a country willing to allow a base, and would probably feel cheated to find out that the solution was an ocean platform, an idea his own engineers would probably come up with even before it eventually came out that was what Grant's company had done.

That wasn't the way he liked to do business, so Grant shook his head.

Killeen sagged.

"I'm going to count on my people being good enough to finish the job first and win that prize. But you came in here in good faith and warned me about Gaia Jihad, which you didn't have to do. So, since you gave me some information before it became public knowledge, I'm going to return the favor. Your engineers are going to be kicking themselves when you say," he held up two fingers, "two words: ocean platform."

After a moment, Killeen laughed. "Oh, there will definitely be some embarrassment when Mr. Business-School-CEO tells the engineers what they should have thought of themselves. And I appreciate your candor. If for any reason my company ends up winning instead of yours, talk to me. We might be able to work out a deal to keep your company ... afloat, so to speak."

Grant was talking to his stockbroker about selling off another chunk of his portfolio when his computer notified him of a call on another line from Alexander Pittakys.

Alex Pittakys had been one of Grant's roommates during his senior year at Texas A&M, and they'd kept in touch over the years. Grant had even donated a few hundred thousand dollars to the environmental non-profit Alex ran, the Foundation for a Better Earth.

Telling his broker he would call back later, Grant switched to the other line. "Hi, Alex." Then, noticing his friend's serious demeanor, he asked, "What's the matter?"

"You know I want you to succeed with this elevator thing, right?"

"Yeah, I appreciate the way you

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helped smooth things over with that Brazilian rainforest group last year."

Alex nodded. "I still support the project, even after the accident in Ecuador. I believe in you, Grant."

Where was Alex going with this? "Thanks."

"But I think you need to slow things down a bit. You're forging ahead with a new plan that hasn't been adequately studied. What are the long-term effects on the ocean environment? What if there's another accident?"

"It wasn't an accident. It was sabotage. A Gaia Jihad terrorist."

Alex swore. "Every time those morons do something, the public blames all environmentalists. Makes my job ten times harder."

"We're taking precautions to prevent them from sabotaging us. I understand your concerns about the ocean environment, but my people have looked at the potential impact: our floating platform will have much less of an ecological footprint than an oil rig." Grant pointed a finger toward the ceiling. "Our structure goes up from the water, not down into it."

"'Not as bad as an oil rig' is hardly a recommendation."

"Touché. I'm just saying the impact is hardly unprecedented. And the SpaceLifter will be far more valuable to the world than any oil rig."

After letting out a long breath, Alex said, "You always were one for the grand view. Just be sure you've got all the details right."

"Believe me—I'm even more concerned about making this work than you are."

Soon there were only five kilometers left to go, then three. Work on the floating platform, aboard a Norwegian-flagged freighter called the *Northern Rose*, was on schedule to finish shortly before the nanofiber cable reached sea level. Meanwhile, company security personnel had investigated every Sullivan Space Technologies employee involved in any way with the SpaceLifter project. They had interviewed each employee while conducting voice-stress analysis, searched the history of employees' transactions, and had even run each employee's biometrics through the U.S. government's terrorist database. In addition, Grant had brought in an outside security consultant to check on his own security people.

All that effort had turned up one-hundred and seventeen employees having extramarital affairs, fifty-seven with large gambling debts, fourteen with concealed criminal records, and even six who were smuggling drugs using company equipment. But there was no sign of anyone involved with Gaia Jihad.

Grant mulled over the security report while digging into his Rib Eye Louisianne at Resa's Prime Steakhouse. The failure to find a saboteur could mean there wasn't one to find. But there was no way to be sure of that. Either way, he would just have to rely on his employees to be vigilant enough to spot any problems.

"You're Grant Sullivan, right?" A young man in a shark-gray suit had approached Grant's table unnoticed.

Grant smiled at being recognized. "Yes, that's me."

The young man pulled some papers out of his inner coat pocket and dropped them on the table. "These are for you. Consider yourself served. Have a nice day."

A lawsuit? Who was suing him? "Hey—" Grant began, but the young man had already turned and was walking away.

Grant picked up the papers and began to skim the first page as he fumbled for his phone. There were about fifteen environmentalist groups listed as the plaintiffs—including, Grant noticed with dismay, the Foundation for a Better Earth. Grant was personally named as a defendant, along with the company. At least that meant he could use the com-

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pany legal staff to fight this. He dialed the number for the company's head counsel, and as it rang he got down to the words "Temporary Restraining Order."

His heart began to beat faster as he flipped through pages of legalese, hoping not to find a mention of the SpaceLifter. Let it be some other project. He didn't know half of what the company did these days, and he'd happily shut down anything else to keep the environmentalists off his back.

The phone stopped ringing. "Grant?"

"I just got served with a TRO. I'm trying to figure out what it's about."

"Turn to the very end and read what the order is. 'It is hereby ordered,' and so forth."

Grant flipped to the end, and began reading aloud. "It is hereby ordered that plaintiffs' motion for a temporary restraining order is granted, as follows: The defendants are hereby enjoined from continuing any work to extend their space elevator below its current height, and are ordered to appear before this court and show cause why the restraining order . . . Well, I guess that's the heart of it."

"I'll get right on it, Grant. I know how important this is for you."

"Thanks, Jerr."

Grant glared at the remainder of his steak for a few minutes until his waitress stopped by the table.

"Is there a problem with your steak?" Her voice was filled with perky concern.

"No, I'm just not hungry." He got up, dropped a few bills on the table without bothering to count them, and walked out.

"Do we have to comply?" Grant looked around the conference-room table at the hastily convened team of company lawyers. "The SpaceLifter's over international waters."

"It's not quite that simple, Grant," said Jerry Verrocchio, head counsel for the company. "In order to take advantage of the space development tax incentives—and keep the company on the priority list for military contracts—we declared the SpaceLifter's orbital station as a U.S.-flag space station. That's a sufficient basis for the court to assert jurisdiction."

"What if we just ignore it for now? Keep building while you argue things in court?"

Jerr shook his head. "If we do not comply, we'll be considered in contempt of court. And whether or not this lawsuit ends up getting dismissed in the end, the court will not tolerate our ignoring the TRO."

"And that will mean a fine of some sort? How much are we talking?" More money to pay, but as long as he could finish the SpaceLifter, Grant didn't care.

"This isn't something you can just pay to settle. Penalties for contempt of court are meant to enforce compliance, which means they will be set high enough that the company cannot afford to keep paying; probably millions of dollars per day. You and other company officers could even be jailed until the company complies. And the judge will be seriously annoyed, which is not a good thing." Jerr shook his head. "No, Grant, I recommend we comply and try to win this in the courtroom."

After pausing a moment, Grant nodded in defeat. "How soon do you think you can get the TRO lifted?"

"We can get a hearing tomorrow. Even if the plaintiffs try to drag things out, it shouldn't be more than a few days."

He had worried that it might be weeks or more. "I'll tell Willy to stop the spool."

The lights were off in Grant's office. He sat in his chair, looking out at the patches of glowing windows in Houston's skyscrapers. He idly wondered what problems were keeping others in their offices so late.

Things had been so much easier when all he had to worry about were his own engineering problems and the

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threat posed by other companies that were merely trying to beat him to the same goal. Lawyers, environmentalists, and terrorists were complications he could do without.

His computer sounded a tone and said, "You have a call from Alexander Pittakys."

"Refuse it."

It stung that Alex's group was one of the plaintiffs in the lawsuit. Even though he knew it was irrational—the lawsuit could just as well have been filed without the Foundation for a Better Earth—the betrayal by his friend gave Grant someone to blame.

A minute later, the computer again said, "You have a call from Alexander Pittakys."

Alex had never discouraged easily. That had been one of the things Grant liked most about him, before. Grant let out a long sigh. Alex would keep bugging him until they finally talked. "Okay, put him through."

The screen sprang to life, showing Alex's face.

"I'm sorry, Grant." Alex spoke before Grant had a chance to say anything. "I know you're probably mad at me, but hear me out."

Grant shrugged. "Unless you're going to say you've called off the lawyers, I don't know what you might say to interest me." Grant waved his hand dismissively at the screen. "After all the money I've given FBE, it's hard to believe you'd turn on me like this."

"Oh, was that money supposed to be a *bribe*? I'm supposed to just shut up about possible environmental problems when you're involved? Your people may not think there's a problem, but mine tell me if your cable were to somehow break and fall into the ocean—"

"Won't happen!"

"You can't be sure of that."

"Well, if I can't be sure of that, it's because your people are trying to sabotage it."

"That's not fair and you know it. Gaia Jihad are *not* my people. In fact, they sometimes target mainstream environmentalists for being 'insufficiently dedicated to the cause.'"

Reluctantly, Grant nodded in acknowledgement.

"Because they are a threat to us, too, we have a security firm keeping tabs on their activities, as much as possible. And that's the main reason I called—to warn you. It's only scuttlebutt, really. But apparently Gaia Jihad just made a major deal to buy military hardware on the European black market. It could be for an attack on you."

"What kind of military hardware?"

"I don't know. The info is sketchy."

"Thanks for the staggeringly useful information. So glad you called."

Alex shook his head slightly. "Take care of yourself." He hung up.

It had taken eighteen hours to actually slow the spool to a stop without putting too much stress on the cable, so it now reached down to a tantalizingly close 2,416 meters. But it would go no further until his legal department could convince the judge to lift the TRO. Lawyers for the environmental groups, on the other hand, had asked the judge to issue a preliminary injunction against the SpaceLifter until there could be a full trial.

The judge had held three days of hearings, with expert scientific testimony on both sides, and after one and a half days of deliberations, her office had notified the lawyers that she would deliver her ruling at 3:30 that afternoon.

Grant had decided against going to the courthouse to hear the decision in person, choosing instead to remain in his office and watch the court's video feed over the net. If the ruling was favorable, he could get operations restarted as quickly as possible. And if it was not . . . He'd already thought about that, and didn't want to think about it any more. Surely the judge had to understand the importance of space elevators to the future

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of humanity in space. She had to see that the only reason the NanoSpacial elevator had turned out to be dangerous was because of sabotage—by a fanatical environmentalist, no less. Reason would prevail. It had to.

"All rise."

The bailiff's voice called Grant's attention to the screen, which showed the judge as she took her place behind the bench, and Grant tried unsuccessfully to find some signal in her body language indicating which way she was going to rule.

"The issues in this case are not clear-cut," said the judge. "The defendants have presented evidence that their so-called 'space elevator'..."

So-called? The judge continued to speak, but Grant could already tell the ruling would be bad.

NanoSpacial was fighting a similar battle in a California court, and he doubted they would have more luck there than his company had found here. So his new friendliness with Juan-Carlos Killeen would not do any good. Meanwhile, the environmental groups had failed to convince a French court to halt Industrie Olympiae's elevator, so their project was still making progress, and was probably no more than three months away from completion. He tried to be philosophical about it—IO's elevator would prove the concept worked, and eventually there would be plenty of space elevators—but it didn't help. Since he was a teenager, he had dreamed of building a space elevator, and it had been the center of his life for the past five years. He wanted to finish it. He was so close.

"The potential harm to the environment—particularly marine life—in the event of a catastrophic failure similar to that which occurred in Ecuador, would be irreparable. Therefore, this court is granting the motion of the plaintiffs requesting a preliminary injunction, until such time as a full trial can be held. The defendants, and any of their agents, employees, or contractors, are enjoined from any and all activities that would extend any part of their 'space elevator,' or any similar construction, below its current altitude, or to connect it with any station, either on land or on water."

Grant turned off the screen and leaned back in his chair. He felt suddenly drained; he didn't even have the energy to be angry at the judge.

It was over. It would be months or maybe years before a full trial could be held. Even if the judge's order was overturned on appeal before that, it would be too late to save the company. He'd juggled the finances as much as he could, and had found the money to keep things going for the six more weeks it would take to get the cable all the way down and send a climber all the way up. He was sure he could have kept the company afloat with either the prize money or loans based on the prospective future revenue from lifting cargo into orbit.

But there was not enough money to put things on hold during an appeal and then finish the job if they won the appeal. No, the dream was dead; it was now time for damage control. By selling off the profitable divisions of the company, he would probably be able to pay off the company debts, and maybe start over as a space technology consultant. Or maybe just retire and take his motorboat to spend the rest of his life fishing on some mountain lake.

His phone rang on one of the company lines, but he didn't recognize the extension. Probably some engineer on the SpaceLifter wondering if he still had a job.

He considered letting it go to voicemail, but his people deserved better than that. He activated the speakerphone. "Sullivan here."

"Uh, Mr. Sullivan? My name is Carolina Bishop. You met me about three years ago when your company hired me, but you may not remember me. I've been working on the NASA contract for the Mars Atmosphere Cargo Transport."

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He didn't remember her at all, but he had a vague memory of the MACT project. He'd spent so much of his time focused on the SpaceLifter that he hadn't paid much attention to the other projects his company had taken on.

"Is there something wrong?" Just what he needed—another problem.

"No. In fact, we're ahead of schedule. That's why when I heard the news about the court ruling, I decided to call you. We were going to deliver the MACTs to NASA next week, because the contract has an incentive bonus if we delivered more than three months in advance, but—"

"How much money are we talking about?" Grant couldn't keep the eagerness out of his voice.

"Two million dollars."

Not enough to make a difference. Twenty times that amount might have. "Well, Ms. Bishop, give my thanks to your team for a job well done."

"No, you don't understand. If we keep the MACTs we've built so far, my team can still fulfill the NASA order. We'd have to pull double shifts for the next four months, and since we'd be a month late, we'd forfeit the incentive bonus, and even have to pay a couple hundred thousand in penalties, but we could do it."

Pinching the bridge of his nose, Grant tried to make sense of what she was saying.

"Mr. Sullivan? Are you still there?"

"I'm sorry. I've got a lot on my mind right now. So, please explain why on Earth I would want to forfeit two million dollars when I'm in debt up to my eyeballs?" After he finished speaking, he realized he must be under too much stress. He shouldn't have revealed how bad things were.

"Because we can use the MACTs to make the SpaceLifter operational. I assumed that was a higher priority than the incentive bonus."

"The SpaceLifter project is dead. I thought you said you heard about the court ruling."

"Yes, but we can get around it if we use four of the MACTs to support a platform, and the fifth as a sort of ferry. I've run some simulations, and it should be stable enough for smaller cargo shipments. Later we could add more, which would allow larger cargo."

She sounded like she knew what she was talking about, even if Grant still didn't know. It was time to admit the extent of his ignorance. "I'm sorry; I haven't been keeping track of your project. Other than the fact that it's a project for air transport on Mars, I don't know anything about the technical details."

"Oh." She sounded embarrassed. "The MACTs are blimps."

He blinked. "Blimps? We're making blimps to transport cargo on Mars?"

"Yes. The Martian atmosphere is only about 1 percent as thick as ours, so even in the lower gravity, planes have to go a lot faster to get the same amount of lift as they would on Earth. With the scarcity of fuel on Mars, it's very wasteful. And the inertia problem . . . Well, let's just say planes are useless for large cargo. The thin atmosphere also means blimps have to be bigger to give the same amount of lift as on Earth, but once the blimp is filled, that lift is constant, so you're not wasting fuel on lift."

"But I still don't see how . . ." And then he did. He slapped the desk. "Brilliant."

The court order prevented them from bringing the bottom of the SpaceLifter's cable any lower. But if they built a mid-air floating platform around the end of the cable, that might get around the injunction. He'd have to get the lawyers on it to be sure, but it was the only hope left.

"You may just have saved the company, Ms. Bishop. I'm coming out to your project, and I'll fly in Willy Horst and some of his people as well, to get things started for the platform." He paused. "Uh, where are you?"

"Melbourne, Florida."

Grant looked at his watch. "I'll be

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there in a few hours."

"You're planning to use *hydrogen* to fill these blimps?" Grant raised his eyebrows. "Bad enough that everyone thinks the SpaceLifter is just looking for an excuse to plunge from the sky, but you want to combine that with the Hindenburg?"

Carolina Bishop stiffened in her seat. "Hydrogen didn't cause the Hindenburg fire—that's a myth that was disproved decades ago. It was the skin of the zeppelin that burned, because it was made of remarkably flammable material. It was not the hydrogen. The Hindenburg's sister ship was made with a less flammable skin and flew over a million miles filled with hydrogen, and she never had a problem."

"Still, couldn't we go with helium?" asked Willy. "It isn't flammable at all, and I think it would make people feel safer."

"Our MACTs are safe. The skin is made of specially prepared non-flammable carbon nanofiber, divided into ten separate chambers. They are not going to catch fire or explode or cause any kind of disaster. Even if all the hydrogen in one chamber spontaneously decided to explode,"—she waved her hands to indicate an explosion—"the material is tough enough to contain the explosion. They were designed with hydrogen in mind, because hydrogen's a whole lot easier to find than helium on Mars. Trust me, Mr. Sullivan, they're safe." She stared directly into Grant's eyes.

Hire smart people and trust them to come up with solutions. He'd said that was the company's secret to success, and now he was being asked to back it up. "Hydrogen it is."

"Good, because hydrogen provides an 8 percent improvement in lift over helium. Even though the increased buoyancy due to the thickness of Earth's atmosphere will allow us to lift 180 times the proposed payload for Mars, based on the details of the platform Mr. Horst has given me, we're going to need that margin."

"Since we're all going to be working closely on this until it's finished, let's dispense with 'Mr. Horst' and 'Mr. Sullivan.' He's Willy, I'm Grant."

Carolina nodded. "Okay, Grant. As I was saying, the hydrogen in the MACTs will provide all the lift to suspend the platform. The propellers will be used only to stabilize the position when needed. Given that the mass of the platform is a hundred and fifty tons, it should be fairly stable just from its own inertia, and so it's possible that solar power would provide all the energy needed for the props. If not, fuel usage would still be fairly low."

"I still find it hard to believe," said Willy. "Each of these zeppelins of yours is supposed to hold up almost forty tons?"

"A hundred years ago, the United States had two dirigibles that could carry over seventy tons each. In the early 2000s, a German company called CargoLifter planned to build a zeppelin capable of carrying a payload of *one hundred and sixty tons*, and it would have worked if they hadn't run into financial problems. That one could have carried your platform all by itself."

Grant tried not to wince at the mention of financial problems. The fact that the name CargoLifter was so similar to SpaceLifter didn't help. "It seems counterintuitive, but we'll take your word for it that the MACTs can lift that much weight. The thing that worries me is that the platform is free to move up and down. We all saw what resonance can do—that NanoSpacial platform was fastened to bedrock, and it started bouncing up and down until the cable finally broke. What's to keep our platform from bouncing even more?"

"Our shock absorbers haven't been sabotaged," said Willy. "They'll keep things steady."

"I know, but . . ." Grant scratched behind his right ear. "I'd feel a whole lot better if it were fastened down."

"Actually, I think that's the worst thing you could do," said Carolina.

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Grant wrinkled his forehead. "What do you mean?"

"Well, resonance becomes a problem when periodic force is being applied at the natural frequency of the cable, right? The vibration keeps getting more powerful, and eventually the strain on the cable becomes too much and the cable snaps." She took a deep breath and continued, "In order to keep the platform steady in the sky, the MACTs will be at neutral buoyancy, providing exactly enough lift to hold up the platform. We do that by pumping air into ballast chambers inside the blimp and compressing the excess hydrogen into storage tanks. When we need more lift, we just reverse the process." She looked at Grant and then Willy, as if to make sure they were following what she was saying.

Grant nodded to encourage her to continue. He didn't know where she was going, but so far she seemed to have an answer for everything.

"So, if the tension on the cable starts getting too high, we increase the lift, and take the platform higher. Kind of like loosening a guitar string. Reduce the tension, and the cable won't snap. But you can't do that with a ground-based platform." She smiled and leaned back in her chair.

It sounded right. Grant thought it over, and realized she was even more right than she knew. "Not only do you reduce the tension on the cable, but you also alter its natural frequency. That could put it out of sync with whatever was causing the vibration in the first place and prevent further resonance."

She opened her eyes wide, obviously surprised that Grant had seen something she hadn't.

Grant laughed. "I may spend most of my time now worrying about finances and politics, but I was an engineer before I was a businessman. I had to come up with solutions on my own before I could hire smart people to come up with them for me."

* * *

Because they were originally intended to be launched into space and transported to Mars, with their propellers folded, the five uninflated MACTs took up surprisingly little space on the cargo plane. Grant stood on the tarmac and watched through his nightglasses as they were unloaded at Santana Base, the Sullivan Space Technologies facility in Brazil. It was three in the morning, local time, and while the normal runway lights were on, the floodlights were not. So far, they'd managed to keep the whole aerial platform idea a secret, and he hoped the secrecy would hold for just another thirty-six hours. By then, if all went well, an automated climber would be racing up the cable at seventy-five kilometers per hour.

Opponents of the SpaceLifter might see his absence from company headquarters as an indication that something was going on. Still, here he was safe from any process server, and he felt better being actively involved in the project instead of just monitoring things from his office.

Carolina came and stood beside him. "Willy says the platform should be ready for lifting by midnight. We'll start inflating the first two MACTs as soon as the sun goes down this evening."

"We need a new name."

"What?"

"MACT. Mars Atmosphere Cargo Transport. We're not on Mars."

She laughed. "Well, EACT doesn't sound so good. At least with MACTs, it almost sounds like 'Max.'"

"It's not important, I guess." He sighed. "It's just that I don't like this sneaking around in the night. Space travel used to be something we were proud of, something bold and public. We named our rockets after Greek or Roman gods, and everyone watched as we soared into space. Look at us now: naming things with boring acronyms and working in secret so the courts don't shut us down." He shook his head. "Never mind. Contin-

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ue what you were saying about the plan."

"At around midnight, four MACTs will lift the platform and carry it out over the ocean. They'll be in place an hour after dawn, so there will be plenty of light for Willy as he supervises attaching the cable."

"Okay." Grant didn't say it now, but he planned to be on one of those four MACTs, so he could be there when the connection was made.

"Meanwhile, after the platform is airborne, we'll start inflating the fifth MACT, and then load it with the climber and the first spool of cable. It should leave here well before dawn, but since its load will be lighter, it should arrive only about an hour later than the four MACTs carrying the platform."

"Sounds good." Grant watched as a flatbed truck took the last of the MACTs into the hangar, where company security would guard the blimps against sabotage. There was nothing more to be done tonight, except try to sleep.

"The specs really don't give a good idea of how big they are." Grant had seen blimps flying over football games, but either of the two inflated MACTs now floating over the platform could have its nose over the bleachers in one end zone and its tail over the bleachers of the other.

"Beautiful, aren't they?" Carolina said.

The lights necessary for the work still proceeding on the ground illuminated the undersides of the MACTs. "Like whales swimming among the stars," he said.

"You're going to have to fly in one someday soon. You'll love it."

He wasn't sure why he hesitated before he said, "I'm planning to go up tonight, with the platform."

"Oh." She sounded disappointed. "I thought you'd be running things from here on the ground."

"I like to be wherever the action is." His phone chirped, and he slid it from his pocket and answered. "Sullivan here."

An electronically distorted voice said, "Mr. Sullivan, you are blaspheming against God and our Mother Earth. If you do not stop yourself, Gaia Jihad will stop you. This is your only chance to prevent a disaster of your own making."

The connection went dead.

After Grant relayed the message from Gaia Jihad, everyone around the conference table sat in stunned silence for several seconds.

"You see why I stopped work and put everything under guard."

Carolina's brow wrinkled. "You're not giving in to them?"

"It's a bluff," Willy said. "They haven't been able to sabotage us, so they're trying to scare us off."

Grant nodded. "It's possible. Maybe even likely—company security hasn't found a trace of any Gaia Jihad infiltration. Everything has been double-checked for flaws, intentional or not. Still, maybe there's something we've overlooked. How long would it take to check every part of that platform again?"

"The hardware? A week, if we push it." Willy sighed. "But to be safe, we probably shouldn't push it. Say two weeks. But the software?" He turned to look at one of his assistants.

"There's too much code. If there's a rotten Easter Egg in there, it could take months to locate."

"Concentrate on the hardware, then," said Grant. "Since they used the software angle against Nano, they would expect us to go over the software with a fine-tooth comb. So they probably would have aimed elsewhere. Unless they anticipated—"

Carolina interrupted him, her voice melodramatic. "No! That's just what they'd be expecting us to do!" Then she giggled. "I'm sorry, but it's like something out of an old movie. I agree with Willy — it's a bluff. They haven't been able to sabotage us, so they're trying to delay us until they can organize something."

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Leaning his head back, Grant looked at the ceiling tiles and let out a long breath. "If you're right, and I think you are, I just gave them what they wanted."

"It's understandable," said Willy at the same time Carolina said, "Yes, you did."

"Sorry, folks. By shutting everything down, I've lost us a couple of hours, but let's get back out there and make this work."

"But the Sun will come up before we're through," said Willy.

"Forget secrecy. Speed is what matters now."

Excitement and pride had mingled with regret as Grant watched the four MACTs carry the platform toward the rising Sun. There had still been too much to do getting the fifth MACT ready for launch, and so he had decided to stay behind to supervise the loading of the cargo.

The cargo container and crew compartment were not an integrated part of the MACT; they needed to be attached to cables that hung from it. Once in flight, they could be reeled up to the bottom of the blimp.

Grant was inside the cargo container checking over the spool of nanofiber cable when Carolina rushed inside.

"Grant, you've got to come outside and see this."

His heart pounded. "What's wrong?"

"Nothing's wrong; you just need to see this."

He followed her outside until they were a good thirty meters away.

She stopped, turned and pointed above the way they had come. "Look."

Floating above the cargo container was the final MACT. Hanging on its side were six pieces of white material, each with a large black letter painted on it. "CETUS I," he read aloud.

"It's no longer a MACT."

"Cetus, the whale. The sea monster of Greek mythology. Perfect." He smiled. Then, after a moment's thought, he said, "Won't those sheets interfere with the solar-electric cells?"

She shrugged. "A bit, but we've got fuel to spare. Anyway, they're just plastic sheets hung with some rope. I can detach them if they cause a problem. But the important thing is: the Cetus I is ready to go. Once your cargo's all squared away, we can take off any time. I assume you want to hitch a ride?"

Three days with almost no sleep had taken their toll, so Grant was semi-dozing in his seat when Carolina's voice brought him back to reality.

"We've got a leak."

"A leak?" Grant leaned forward in his seat. "Is it serious?"

She laughed. "Not that kind of leak. Santana Base says CNN has broken the story that we're using blimps for our space elevator. They even have some shaky videocam footage of us heading out to sea."

"Is the coverage positive or negative?" Were the news media spinning the story as "Those Ingenious Engineers" or as "Company in Contempt of Court?"

Carolina flipped a switch. "Santana Base, our CEO wants to know if the coverage is positive or negative." She paused. "Santana Base, your last transmission was garbled. Please repeat."

A longer pause. "Santana Base, come in, please." She turned to Grant. "Looks like there's some interference. I can't get anything from them now."

Grant frowned. "Wonder what could be causing it. We're not too far out, are we?"

"No, we should be fine."

"Try to contact Willy or somebody with the platform."

She tried a few different frequencies, but had no luck. Meanwhile, Grant pulled out his phone, but found it wasn't getting a signal either.

It might be sunspot activity. But Grant had a growing suspicion that the interference wasn't natural. "Anything showing up on radar?"

"It's clear. No, wait. I'm not sure. There

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may be something to the west. Real fuzzy, though."

"They're jamming our long-range communications. If they've got electronic warfare capability, they're probably military."

"Military? Whose military would be after us?"

"Military technology, I mean. Could be owned by a private company, or . . ."

Nodding, Carolina finished his sentence. ". . . or by Gaia Jihad."

Alex had tried to warn him, Grant realized, but he'd been too angry about the lawsuit to pay attention. "No weapons on this thing, are there?"

"No."

"Then turn us around, head back to base. Maybe they'll break off if it looks like we're quitting." It was a slim chance, and Grant didn't put much faith in it.

Carolina didn't say anything as she worked at her pilot's console, but Grant felt the Cetus start to turn.

"How much damage can we take before we crash?"

"Since we have a light load, we can remain airborne even if four of the ten gas compartments lose their hydrogen. That's if they're spaced out, though. If all four are at the front or back, we'll be too unstable." Se looked more closely at the radar screen. "That's strange. They were coming in at almost three hundred knots, and now they've slowed to under fifty. How'd they—"

"There they are." Grant pointed out the window to starboard. As it grew closer, Grant could make out the configuration of the aircraft. There was a large single jet turbine behind the cockpit, and after a moment he recognized what it was. "It's a Vespa—single-seater Italian-made jet with vertical takeoff and hover capabilities."

There were rapid flashes from the wings of the jet, and immediately an alarm began to sound at Carolina's console. "We're losing hydrogen. Multiple holes. Must be using diamond-tipped bullets to cut into the nanofiber like that."

The Vespa flew over the Cetus, and Grant whirled to see it flying away on the other side.

"How bad is it?" he asked. He felt helpless; there was nothing he could do but sit and watch.

"If that's all he does, we're okay. The nanobots crawling the inside of the gas compartments can fix those leaks. But a few more passes like that and they'll be overwhelmed."

"Give me the radio. I'll see if I can talk to this guy."

She handed him her headset.

Grant could see the plane begin to turn. He switched to the emergency channel and hoped the Vespa's EW capability was sophisticated enough to filter out its own jamming. "Pilot of the aircraft that is attacking us, I don't know how much you're getting paid to do this, but I'll double it if you stop. Please respond."

The jet began approaching them again.

"I'll pay you double or twenty million dollars, whichever is higher. Or more. Name your price. Please respond."

A voice came over the radio. "Capitalists! You think everything and everyone can be bought. Well, you are about to pay for your crimes."

At least the pilot was responding. That meant there might be a way to negotiate. "You want to protect the environment? I'll donate a hundred million dollars to environmental groups of your choice. Think of all the good you could do with that money."

"And let you complete your blasphemous abomination? Never."

The Vespa let loose another torrent of fire as it swung past.

Grant's mind raced. Fanatics like this would have no compunction about killing him and Carolina, and all the people on the platform. They'd proven that when they brought down NanoSpacial's elevator. But what else could he offer?

And then he realized he was thinking

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like a businessman, not an engineer. The man attacking them was unstable; all he needed was a little force applied in the right direction.

"Never mind," Grant said. "I withdraw my offer. My pilot tells me your bullets can't do enough harm to bring us down. So go ahead, keep firing. This has to be the most pathetic attempt at a terrorist attack I've ever seen."

Carolina looked at him, her eyes wide.

"You lie," said the voice on the radio.

"Been nice talking to you, but I'm bored now. Say hello to your masters for me; I'm sure they'll be real pleased with your mission failure. Goodbye." He took off the headset.

"Are you crazy? What was that about?" said Carolina.

"I hope I convinced him that firing on us was useless. I also hope that you weren't exaggerating the strength of the material the Cetus is made from."

The Vespa had turned, and was approaching again. It was hard to tell from this angle whether it was increasing in speed.

"What?"

"Brace yourself. I hope he's going to ram us."

Suddenly the roar of the jet overwhelmed his ears. It was definitely lower than before.

Grant's body slammed into the safety restraints. He felt a sharp pain in his neck as his head was jerked to the side.

The roar of the jet faded. The crew compartment swung from side to side.

"Check the radar," he said. "Where's the jet?"

Carolina rubbed her neck as she looked at the readout. "It's below us, and going down fast. I think it may be out of control. What happened?"

"He rammed us. It was our only chance. If he'd broken through into one of the compartments, I think he would have set off the hydrogen, and you said the Cetus could take that. But he didn't break through, so he just crashed his plane into us at a few hundred miles an hour, and I think the g-forces knocked him out." The collision might even have killed the pilot, but with the Cetus acting like a giant airbag, it wasn't certain.

She stared at him. "That's a lot of confidence in the construction of this thing."

"No, it was confidence in you. You told me what this ship could withstand, and I believed you."

Carolina turned away, and began checking her console. Then she gasped. "The jet is coming back up. He must have recovered in time."

Grant bit his lower lip. "Any ideas? It'll probably take one even crazier than my last one."

She shook her head.

The Vespa rose beside them, hovering about forty meters off their port side. The howl of the engine filled the cabin as it drew closer. Knowing that he was going to die, Grant felt a strange calm. He could even see the irony that a Vespa was going to kill a Cetus—a wasp was going to kill a whale.

Suddenly, Grant shouted, "The letters on the side! You said you could release them? Do it!"

"Release them?" Carolina's hands flew to the keyboard on her console.

The Vespa drew closer; any moment now the pilot would begin to fire on the cabin.

Something white fluttered in the window, and suddenly it was sucked toward the Vespa and into its large turbine. The engine's roar turned into the scream of tortured metal, and the Vespa started to fall. Its guns began firing, but it was too late.

Both of them watched as the plane dropped until it disappeared in the clouds below.

Carolina spoke first. "I didn't think a thin sheet of plastic would do that much damage to an engine."

"It wasn't the sheet. It was the rope attached to the sheet. Ever tried to untangle fishing line from a motorboat engine?"

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* * *

Grant watched his dream come true on CNN. The screen showed the cable-crawler as it covered the last few meters to the Sullivan station in geosynchronous orbit. When it reached its proper position, it stopped, and several of his astronauts swarmed around it to lock it into place. CNN began to scroll text across the bottom of the screen: "Sullivan Space Technologies wins $250 million Otis Prize for first space elevator."

The employees who were gathered in Grant's office began to cheer. He went around and shook their hands, thanking each of them for the effort they had put into the project. They were only a fraction of those who had worked on the SpaceLifter, and Grant planned to do a lot more handshaking in the coming weeks. He didn't say anything now, but he also planned to pay a lot of bonuses as soon as the prize money was awarded.

Eventually the crowd thinned, until only Willy and Carolina were left.

"Hard to believe it's over," he said. "I've focused so much on this over the past few years. I'm not sure what's next."

"You'll find something," said Willy. "There's always something new, something farther."

"Something farther?" Grant thought for a moment. "Well, I've heard a rumor that NASA's thinking about funding a manned mission to Jupiter." He looked at Carolina. "Think you can build a blimp that would work in that atmosphere?" ■

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The Sunborn, Gregory Benford, Warner, $24.95, 330 pp. (ISBN: 0-446-53058-1).

The Unhandsome Prince, John Moore, Ace, $6.99, 266 pp. (ISBN: 0-441-01287-6).

The Well of Stars, Robert Reed, Tor, $25.95, 299 pp. (ISBN: 0-765-30860-6).

Sunstorm: A Time Odyssey: 2, Arthur C. Clarke and Stephen Baxter, Del Rey, $25.95, 328 pp. (ISBN: 0-345-45250-X).

Gil's All Fright Diner, A. Lee Martinez, Tor, 268 pp., trade paper ($12.95, ISBN: 0-765-31471-1) and simultaneous hardcover ($23.95, ISBN: 0-765-31143-7).

Pay the Piper, Jane Yolen and Adam Stemple, Tor Starscape, $16.95, 176 pp. (ISBN: 0-765-31158-5).

The World As It Shall Be, Emile Souvestre, trans. Margaret Clarke, Wesleyan University Press, $29.95, 249 + xxvi pp. (ISBN: 0-8195-6615-2).

The 2004 Rhysling Anthology: The Best Science Fiction, Fantasy & Horror Poetry of 2003, Drew Morse, ed. (Rhysling Chair), Science Fiction Poetry Association, available from Dark Regions press, $7.95, 64 pp. (ISBN: 1-888993-40-5).

American Science Fiction TV: Star Trek, Stargate and Beyond, Jan Johnson Smith, Wesleyan University Press, $22.95, 308 + x pp. (ISBN: 0-8195-6738-8).

Beam: The Race to Make the Laser, Jeff Hecht, Oxford University Press, $29.95, 274 + x (ISBN: 0-19-514210-1).

Gregory Benford's *The Martian Race* (reviewed here in March 2000) left Julia and Viktor alone on a Mars made mysterious by underground fungoid life forms. As **The Sunborn** opens, we see the scene years later, when Earth has sent many more researchers under a corporate aegis more interested in the bottom line than in science. Fleeing a new manager, Viktor and Julia go exploring in a new location, find a rich trove of "Marsmat," get the notion that it is somehow trying to communicate, and try an impromptu experiment that nearly electrocutes Viktor. Meanwhile, the corporate chieftain's daughter, Captain Shanna Axelrod, is exploring Pluto, discovering unexpected warmth fueled by ion currents from beyond, finding life plagued by robotic "Darksiders," and establishing communication with the aid of a computerized translator (known as Wiseguy).

So Axelrod sends a fast fusion-drive ship to Mars to pick up Julia and Viktor and haul them out to Pluto to help. Not that Shanna really thinks she needs help. She's proud and prickly, not on terribly good terms with Dear Old Dad, and more than a bit jealous of Julia, the "Queen of Mars." But they manage to work together, and when they plunge out past Pluto in search of the source of the ion currents that warm the outermost world and even energize its too-simple ecosystem, they discover a realm of intelligent Beings, some larger than worlds, constructed of plasma and compacted magnetic fields. After a suitable battle, Wiseguy helps with communica-

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tion and the negotiations begin.

Earth is concerned that the heliopause is moving in toward the inner worlds, bringing with it a flood of interstellar hydrogen that threatens drastic effects on Earth's climate and livability. Can the Beings help? Well, why should they? What can such tiny, cold things as humans offer them? Some Beings are curious about the inner worlds; they have even done interesting experiments. Some want nothing to do with them and even think humanity should be destroyed; they know how to throw rocks. But Julia is an insightful woman . . .

Benford has constructed a fascinating vision of the depths of space, populating it with aliens as interesting and as vital as his human characters, who suffer a bit because most of the time his focus is more on the vision than on the people. All in all, *The Sunborn* is excellent fare for hard SF fans, Benford fans, and all who want to know what happened to Julia and Viktor.

Every genre has its comedians. In SF&F, prominent names in recent years have been Robert Asprin, Terry Pratchett, and now John Moore. None are really slapstick enough to call them "The Three Stooges of SF&F," but they definitely display a gift for comedy.

Moore's maiden effort was *Heroics for Beginners* (reviewed here in December 2004), in which he played fun games with the Evil Overlord Manual. Now he brings us **The Unhandsome Prince**, which begins with Caroline, the most beautiful girl in the Kingdom of Melinower, industriously kissing every frog in the local swamp.

Why? Well, seven weeks previous, Prince Hal, sent by his royal dad to steal the philosopher's stone from the local witch, got caught. With a cackle of glee, witch Amanda turned poor Hal into a mobile flycatcher and tossed him into the goop. Then she passed the word that if any of the local girls could find him and kiss him, she would marry a handsome prince. Soon thereafter, she died, meaning that nobody could then ask her what the heck she thought she was up to.

Alas, Caroline is not impressed. Prince Hal turns out to have distinctly dweebish looks. But he's her ticket out of the village, so, accompanied by the witch's daughter Emily, an apprentice witch who seems to like Hal a bit too much for Caroline's taste, off they go to see the Big City, the Palace, and the Royal Family, which is well up to its ears in debt. Hal's brothers, it turns out, are much more handsome than he, though Kenny is an abysmal jerk and Jeff seems to be an accountant. Add in a magic sword, Rumpelstiltskin, Rapunzel, a tourney, and an incipient expulsion of the Jews (as in Spain, a handy way to cancel an overload of debt), and you have a thoroughly scrambled fairy tale that works quite well. Thanks to a key word in the witch's promise, the girls even get the right guys and "happily ever after" looks like a genuine possibility.

Have fun!

In *Marrow* (reviewed here in January 2001), Robert Reed gave us a vast starship the size of a world, barreling into the Milky Way from beyond. Robot craft from thousands of species and worlds flew out to meet it and goggle at the monstrous rocket nozzles protruding from its backside. Then come the living beings, and humans—highly engineered and virtually immortal—won possession, learned that the great Ship was apparently as old as the universe, repaired the Ship's assorted systems, and invited others to come aboard, for a price. In time, over the millennia, the Ship came to contain billions of individuals of thousands of species. Some made the Ship home. Some found it a convenient way to travel through the galaxy. And then the Captains discovered that at the core of the Ship was a vault containing a cargo (perhaps a being) as old as the Ship. Exploration led to disaster and, millen-

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nia later, rebellion.

But the rebellion was put down. When **The Well of Stars** opens, the damaged Ship is being repaired. Miocene, the Ship's captain, is now little more than a figurehead. Washen, at the beginning of *Marrow* a mere meeter and greeter of aliens, is now second in command by title but first by function. And the Ship is headed toward an inky black nebula known as the Ink Well, whose neighboring worlds report visits by oversized versions of their natives. Investigation reveals signs of life throughout the nebula: the sparks of fusion reactions, vast rivers of dust and water, movement, and a darker zone soon dubbed the Satin Sack. A visit discovers the polypond, a world-sized glob of water and chemicals; a huge being that seems quite cooperative. The Ship's course cannot be changed? Then it must sweep a channel clear so the Ship's passage will do no damage.

But soon it is clear that the polypond knows of Marrow and its cargo, wants access to it, and is plotting an irresistible assault on the Ship. Whether it succeeds or not, Reed now has the opportunity for a battle that outdoes all sfnal precedent for scale and special effects (sfx).

But his effort only succeeds on that level. This isn't a character novel, but it necessarily has characters, and when characters live for millennia, they are impossible to describe convincingly. Perhaps worse, Reed has to pull several rabbits out of his hat at the end to bring about the conclusion he needs. There is the seventh Theory of Everything that no one believes, but that nevertheless provides the polypond's motivation. There is the discovery, thanks to a bit of genetic analysis and the ancestral records of one of the Ship's many species, of the polypond's true nature. There is an ugly wad of alien psychoanalysis. There is the inspired improvisation, in the best tradition of 1930s SF, for the attack on the unbeatable ultimate weapon. And there is the new villain that pulls the last chestnut out of the fire and means there must be at least one more book in the series.

Glorious enough for scale and sfx to make this one fun for many readers. Less glorious for character and excessive reliance on the waving of magic wands. The combination means that this one is unlikely to win awards.

Arthur C. Clarke's and Stephen Baxter's *Time's Eye* (reviewed here in June 2004) gave us an Earth transformed into a patchwork of eras, climates, geographies, and peoples by some mysterious power, apparently represented by silvery spheres that floated in the air to watch how Russian astronauts coped when they met Genghiz Khan, British tommies met australopithecines, a UN squad from the Afghanistan front met the tommies, and everyone went up against Alexander the Great. Brit Bisesa Durt, a UN observer, found the Big Ball in the Temple of Marduk in Babylon and after suitable revelations, found herself in her London flat, her daughter quite surprised to see her, and the sky outside looking pretty weird.

Sunstorm picks up the tale immediately thereafter, when Mikail, a solar weather analyst on the Moon, notices a massive sunspot just as hyper-genius theoretician Eugene (such a cutie!) arrives to say it's all just as he predicted: Big storm coming, and worse ahead—Earth has just five years before it fries. Meanwhile, England's Royal Astronomer Siobhan McGorran is coping with the results of the current flare—think global EMP!—and getting drafted to Do Something, which means, as soon as Eugene's predictions grab attention, going to the Moon to talk to the experts and begin trying to figure out how to block a massive solar flare.

The tale advances by leaping considerable chunks of time to show the progress being made. Yes, the characters stay with the story, and yes, they get involved with each other, though this is

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hardly a character story. Yes, there are methods that might work. Yes, they require beggaring the world economy, and tapping new reserves of ingenuity, and finally clinging to the edge of the cliff by our fingernails before . . . Well, the ultimate outcome, at least for this book, is fairly predictable.

But then . . . Eugene lives for his computer models, and just because he's spotted the biggest-ever disaster headed straight toward us, he's hardly about to quit. Not at all, and now the models reveal that the disaster is no accident. It was made to happen.

So there's an enemy, and we're mad. There could well be a third volume in that . . .

A. Lee Martinez's **Gil's All Fright Diner** is a fun visit to the sort of horror fiction—loaded with eldritch horrors eager to erupt into the here and now—that was once all too common. As it opens, Duke the werewolf and Earl the vampire are rattling down the road in an old pickup, almost out of gas. Fortunately, they come to a diner. Unfortunately, Duke thinks he smells zombies, and as they're having a bite, here they come.

Loretta, the diner's owner, fetches her shotgun, but Duke and Earl don't need a lot of help. On the other hand, they figure, Loretta does, so they decide to stick around for awhile, do a few chores to earn a full tank of gas, and so on. Pretty soon, Martinez introduces Tammy, or Mistress Lilith, Queen of the Night. She's just a teenaged bimbo, but she has a copy of the *Necronomicon* plus ambitions to release the Elder Gods so they can erase the human world and make her the queen-pin. Bwah-Ha-Ha-Ha! There's also Cathy, a ghost guarding the local cemetery (whence come the zombies), and pretty soon she and Earl are romantically interested in each other. Toss in some undead cattle and the mystic potency of pig latin, and you can see how much fun Martinez is having. Fortunately, her writing skills are great enough that you should have fun too. And if there's any justice in this world, Martinez is already working on a sequel to star Duke, Earl, Cathy, and the ghost of a plucky little dog.

Got a young teen girl in the family? Jane Yolen and her son, musician Adam Stemple, launch their "rock 'n' roll fairy tale" series with **Pay the Piper**, in which fourteen-year-old Callie (for Calcephony, of all things!) McCallan just *has* to go to the Brass Rat concert. Her parents are pure-quill fuddy-duddies, but Callie's a smart kid—she wangles a press pass from the school paper, and tells the folks it's homework. Then it turns out the parental units are Brass Rat fans from waay back, and it's cool, even if they want to go too, along with kid brother Nick.

It feels a bit weird, for Brass Rat's members don't seem to have changed much since the folks were fans. There's flautist Gringras, drummer Alabas, and guitarist Scott, and we know from the start that Gringras is the piper, the same one that led the children out of Hamelin Town so many centuries ago.

But Callie doesn't know that, not until she overhears the concert promoter stiffing the group for their fee, no matter that Gringras "must send silver or gold or souls Under the Hill . . . to pay off a blood guilt, a teind." Then she sees Gringras playing for three dancing rats in the alley. And soon thereafter, all the kids in town disappear.

But Callie has an inkling, and despite the nigh-irresistible urge to dance mindlessly after the missing, she finds an ally and vows to rescue them all. Since it's a fairy tale, the only mystery lies in just how she manages it, and I won't spoil the fun by saying more. A young teen will love it, younger kids too, perhaps even kids so young you must read it to them, and then you can all look forward to the next in the series.

When histories of SF look back, they

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miss a great deal. Fortunately, Wesleyan University Press is helping to fill in the gaps. One recent book was Robida's *The Twentieth Century*, first published in France in 1882 (and reviewed here in October 2004); it was in the old mode of projective futurism, considering at length and with astonishing perceptiveness the social impacts of technological and economic changes. Emile Souvestre's **The World As It Shall Be** first appeared in 1846 and took a dystopian view of the year 3000. The aim was to consider social trends (notably capitalism and the infatuation with progress) more than technological trends, to extrapolate them in roughly linear fashion, and thus to show people what a mess things would be "if this goes on." It is thus a dystopian satire, and its aim was more to change the present than to portray a genuinely possible future.

Souvestre was a prolific writer of countryside (Breton) tales who here reacts against earlier utopian tales. Nevertheless he is working at the very dawn of *la litterature futuriste* (newly named in 1834) and his book is the first major dystopia. His translator, Margaret Clarke, has done an excellent job of making his antique French comprehensible, though the style will require getting used to. The introduction by I. F. Clarke very nicely sets the book in its context.

Every year, the Science Fiction Poetry Association awards its Rhysling Awards for best long and short poems in the fields of SF, fantasy, and horror. **The 2004 Rhysling Anthology** presents the 2003 works members of the SFPA deemed worthy as contenders for the awards. If you have any taste for this side of the SFF field, it's an excellent chapbook to acquire. Sources for the material include major genre magazines, small press magazines, and single-author chapbooks (such as Mike Allen's *Petting the Time Shark*). The poets covered include Diane Ackerman, Mike Allen, Bruce Boston, John Grey, David Kopaska-Merkel, Maureen McHugh, Steve Sneyd, John Teehan, Ian Watson, and many more. The poems themselves vary widely in approach, content, and cleverness. I liked Allen's "How I Will Outwit the Time Thieves," Grey's "Night of the Living Dead," Kopaska-Merkel's "The Mad Scientist Has All the Time in the World," and Teehan's "What to Do When an Alien Spacecraft Lands and the Visitors Come Out to Greet You" (for one thing, "If you own a tractor or pet pig, hide them before giving any major interviews").

It has been forty years since Star Trek brought modern SF to TV. That show was remarkable for the time, but looking back, the sets were pretty cheesy and the sfx were feeble. But it was enough to establish SF in a new realm, a successor to the Western that found a new frontier to resonate with the American ethos. In the '80s and '90s, new computer technology made CGI (computer-generated imagery) sfx possible, and TV SF became something much more striking.

This is the sequence explored in Jan Johnson Smith's **American Science Fiction TV: Star Trek, Stargate and Beyond**. Smith pays due attention to the SF background and such critical contributions as Darko Suvin's *novum*, the place of the sublime (a.k.a. "sense of wonder"), and the new notion of "televisuality," which means roughly the vast improvement in TV imagery that appeared in the '80s. He then surveys series such as *Stargate*, *Farscape*, and *Babylon 5* for narrative techniques, political and social commentary, and assorted other themes dear to the heart of media critics, concluding that "Science fiction television can [now] take on the mantle of a new kind of visual American mythos . . . which the elegiac Western could never actually do, time-tied as it was by the closure of a very real frontier."

Just the ticket if you want to under-

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stand what's going on with TV SF. It might even help answer the question of where the fans are going, and why.

As a science fiction writer, Jeff Hecht has appeared in these pages. As a science journalist, he works for *New Scientist* magazine, and he has tracked fiber optics and lasers for many years. The latest fruit of his efforts is **Beam: The Race to Make the Laser**, in which he follows the story from the early '50s, when the hot news dealt with masers, until a decade later, when "the laser race was fading as news."

The focus is firmly on the people who wanted to be the first to build an "optical maser," and the big labs (such as Bell Labs) that pumped money into the project. There is ego and competition, insights and stumbles, insanities such as the way the FBI confiscated the notebooks of Gordon Gould, a nonconformist in the '50s, when nonconformism equated to traitor, because he wasn't cleared to see them. And then there is the grand story of the little guy, Theodore Maiman, who, working at Hughes Research Laboratory, was the first to make a ruby rod laser, with a setup so astonishingly elegant and simple that others could quickly repeat the work working from little more than newspaper clippings. It seems a shame that Maiman never got a share of a Nobel Prize for his contribution.

It also seems a shame that Oxford University Press can't afford proofreaders good enough to catch errors such as "laser bean" (p. 223). But there are only a few such slips. The book is well worth the attention of anyone interested in the history of science and technology. ■

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BRASS TACKS

Dear Dr. Schmidt,

For Marcus (1956), it is a fascinating experience to be referenced forty-nine years later, in Steven Gillett's "Artificial Photosynthesis" (April 2005). A fact article teaches current and future science and SF communities where a particular sub-sub-specialty is and in what direction(s) it may go. Being cited there gives an aging work refreshed usage and a childless scientist new descendants.

My prior experience with *Analog* science fact reporting stems from the user side at about the same time, in the mid-1950s. A sixty-day submergence time was planned for nuclear-powered submarines. How to contain, convert, and dispose of carbon dioxide exhaled by a crew of 120 for sixty days without leaving a tell-tale trail of bubbles? Of seven people at a brainstorming session, six of us arrived with the same issue of *Analog* (or was it still *Astounding* then?) under our arms, because it contained the best review of carbon dioxide absorption in closed spaces. There may not have been fact articles then, and the review may have been in a story, but in any case, six out of seven working scientists finding the best review in *Analog/Astounding* was a convincing experience for a young scientist/subscriber: sufficiently convincing to keep subscribing for another forty-nine years and counting—and reading.

Rudolph J. Marcus, Ph.D.
Occidental, CA

Hi Stan,

I couldn't agree more with your comments in the April editorial, "Whence Comes Morality?" Nothing drives me up the wall quite like the claim by the pious that religion is the source of morality. They ever hear of Socrates? How do they think the Athenians ever got off the ground? Or anybody else?

I think it was Steven Weinberg who commented that the world would be a far safer and more manageable place if it were populated entirely by agnostics and atheists. It was hard to believe that, in the twenty-first century, after a tsunami had killed 200,000 or so, experts would show up on cable news debating why God hadn't intervened, or whether He was punishing someone.

Sam Harris was on C-Span over the weekend. He is the author of *The End of Faith*, and he was making some of the same points you did. He points out that if you really accepted the Bible as the divine word, and followed its injunctions, you should beat your kids with a stick, kill people for working on the Sabbath (and a host of other silly reasons), and keep slaves.

Jack McDevitt

Dear Dr. Schmidt,

I just read "Whence Comes Morality?" in the April issue, and have to insert my two cents. My statements are sufficiently controversial that I felt the need to throw in some scholarly references that probably make it too long and "researchy" to publish, but it is a topic about which I am passionate.

My definitions differ somewhat from yours. Morality defines that which perpetuates the species (i.e., Thou Shalt

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Not Murder). Ethics defines that which is fair, is species survival neutral, and may or may not be descended from a moral principal (e.g., insider trading is unfair). Culture is an arbitrarily defined set of rules for acceptable behavior which is survival and fairness neutral, but may or may not be descended from either (e.g., to belch or not to belch, that is the question). But, humans being what they are, it is perfectly possible for them to derive morals that do not aid species (or even tribal) survival and I believe they have frequently done so. A good case is found in the book *Sick Societies: Challenging the Myth of Primitive Harmony* by Robert B. Edgerton.

In his book, *In the Name of Identity: Violence and the Need to Belong*, Amin Malouf discusses the development of moralities aimed at perpetuating arbitrarily defined "tribes." Moslems and Jews (both predominantly Semites) kill each other because they cannot agree over who has the proper god. Shias and Sunnis (both Moslems) because they cannot agree over who should have succeeded Mohammed. Protestants and Catholics (both Christians), Blacks and Whites (both humans), and so on, all in the name of morality. (A member of the Irish Republican Army once justified the killing of children with the statement, "I want Irish mothers to suffer.")

James Davison Hunter, in his book, *Before the Shooting Begins: Searching for Democracy in America's Culture War*, points out that, even in America (the "Great Melting Pot"), we are forming partisan groups (tribes) which will commit violence over presumed moral principles (e.g., the murder of doctors for committing the "immoral act" of abortion). And, in his book, *The Coming Anarchy: Shattering the Dreams of the Post Cold War*, Robert D. Kaplan makes a believable case for the country and the world coming unglued into ever-smaller "tribes" continuously engaged in low-level violence.

I believe that sociobiology (see the book by Edward O. Wilson) is well on its way to explaining how the wiring of the brain, developed via evolution over many millions of years in small hunter-gatherer societies, leads inexorably to certain moral, ethical, and cultural concepts (not the same in every society!). The concepts themselves are not hard-wired, but the survival background that points in their direction is. And that direction is the survival of the tribe.

We now have the means to bring humanity to extinction in various ways. Whether through atomic, biological, and chemical warfare to enforce an arbitrary tribal morality, or selfish misuse of the environment to the point of rendering it unlivable, tribalism can kill us all. Sociobiology explains "Whence Comes Morality" and gives us the tools to rise above our evolutionary background. If we will make the effort to understand our evolutionary wiring and overcome it—place the survival of the species above that of arbitrarily defined tribes—we may survive. If not, I wonder what the next dominant life form on Earth may be?

Sam Brunstein
Chapala, Jalisco
Mexico

Dr. Schmidt,

"Alibis, Safety, and Freedom" was a provocative editorial that only scratched the surface.

On the subject of why people want privacy, I can think of several more reasons.

There's discrimination. What you listed as Sawyer's reason only addresses social discrimination. There is also business discrimination, the commonly mentioned example being health insurance and AIDS. Similarly, the auto insurance company might not be so willing to have you as a customer once they find out where you've been parking your car.

Then there's manipulation. Modern marketing and political campaigning are

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already practicing a frightening amount of manipulation of the public using the rather crude demographic data currently available. Imagine what it would be like if "they" knew us better than we know ourselves.

Sometimes privacy it just more expeditious. It's often quicker and easier to get something done when you don't have to be concerned about or deal with the opinions and reactions of others. Just because it is none of their business doesn't mean they won't stick their noses in anyway. Of course, it is more often the case that this is the rationalization for reason two—getting away with it.

Finally, consider the idea that privacy is what allows us to be individuals. Consider how homogenous the public personas of politicians have become during campaigns where the media is watching their every move. Reflect on the urban phenomenon in crowded public areas where people treat each other like they were invisible. There's a natural recognition of the need for privacy, even if it is only an illusion.

Then there is the topic of those safe guards.

Seriously, what reasonably well-informed person would believe that the government would honor any set of safe guards for very long before passing a "patriot act?"

Of course, the government would have to compete with the hackers. Consider how effective identity theft would be if they could steal all the identities in a large city. Then knowing the habits of those people, slip in an extra purchase once a month that would be so like what that person would normally do, that the person would believe they did it.

Dale Eltoft
Raleigh, NC

Dear Editor:

Regarding "Alibis, Safety, and Freedom," privacy is certainly an issue subject to many stimulating creative ideas, but it seems overly simplistic to describe privacy as based on Victorian psychology or ethics and law. Society is economically organized to employ rivalry and competition to improve productivity. Privacy is not just about personal matters; it's about business matters, and virtually every kind of social interaction as well, not just those relating to family. Consider for example, the adversarial system of conducting court cases.

The role of privacy is not just to avoid irrational actions of others, either, because the competitive system is one in which rational attempts to exploit information are balanced, and made productive—and therefore rational—by imposing limits on the information available (as with the complex rules and procedures in the courts, which are only partly adversarial). One can certainly engage in artistic speculation about more sophisticated, or alternative organizations of society in which other strategies are used, and it is very entertaining (especially in the hands of *Analog*'s skillful artists and editors). It might also turn out, with a growth in understanding, that there are some fundamental principles of organization of any kind that requires the kind of features human society has, similar to questions such as whether evolution requires random mutation. Even with certain fundamentals, the exact composition of complex systems, such as just what features are adversarial and which not, can vary—just as how details of the English and American judicial procedures vary, as well as the differences in European parliamentary government and American government structures.

George Lyons
Raleigh NC

Dr. Schmidt,

Regarding the May 2005 editorial, like you, I too wrestled with the concept that Robert J. Sawyer presented in *Hominids*. Many times some idea that

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really seems right, when put into effect, in retrospect, becomes burdensome. I, for one, do not work well under close supervision. When I was in the Marine Corps, I found the regimentation very stressful.

And regarding "The Bambi Project" by Grey Rollins: I really loved Mr. Rollins' riposte to Mr. Baker's flaming letter. I just wish that I had the talent for answering insults that Mr. Rollins has. I really snickered when the deer took his revenge on the hunter.

P.B. Blackwell
Hockley, TX

Dear Dr. Schmidt:

In "Alibis, Safety, and Freedom," you like the idea of the "alibi archive" described in the novel *Hominids*, but worry about its use in our society for the persecution of those with different lifestyles from those in power. I don't think our current technology is anywhere close to making the implementation of the *Hominids* system possible, but assuming it gets to that point, should we implement it? I think that two fairly straightforward restrictions on its use would provide adequate safeguards. First, remember it's an "alibi" archive. Any individual could authorize release of a portion of their own records to establish their alibi if accused, or to establish the existence of a crime committed against them if a victim. Second, a court could order the release of the records of any individual convicted (by other evidence) of involvement in a crime leading to death, or of any individual who died in the process of committing a crime. This release could aid in the discovery of accomplices in the crime, and might be especially useful in investigating acts of organized terrorism such as suicide bombings. The fact that it couldn't prevent a suicide act from occurring is not an argument against its benefits, nor is it an argument for allowing official monitoring of anyone "under suspicion."

Alex McKenzie
Rockport, MA

Dear Dr. Schmidt,

Bringing back the remembrance of Robert Sawyer's *Hominids* reminded me of the possibly more chilling deterrent in the novel—sterilization of the guilty along with relatives (how many depending on the severity of the crime). This, on the theory that the anti-social behavior had a strong genetic background and thus had to be actively rooted out of the society. While I don't think that this would go over today (at least the extension to relatives of the perpetrator), perhaps an extension of the "It Takes A Village" concept would be in order.

What if the nearby relatives/caretakers of the perpetrator became financially responsible for the results of their misdeeds, even if the perpetrator were now an adult? It would be like a clan being jointly responsible for the actions of any member. Would they take a stronger interest in their relative's actions, especially while growing up? Would society allow an even stronger level of control to the adults during children's early years? To what extent could they discipline a young one who was obviously turning anti-social?

I think this extension of Sawyer's vision would have an even greater effect on society. Would there be stories of parents fleeing their home with a child who had accidentally severely injured a playmate? To what extent would the close-knit family hunt down and give up a criminal relative fearing even greater repercussions from the rest of society?

Bernie Carlton
Moxee, Washington

Dr. Schmidt,

In response to your editorial in the May 2005 *Analog*, "Alibis, Safety, and Freedom," I find the idea a chip implant in humans that would monitor an individual's whereabouts and actions sort of

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intriguing, almost like the chip now in newer model automobile computers that retains the last few seconds of vehicle performance, or the legendary "black box(s)" installed in commercial and military aircraft.

I am reminded also of science fiction themes of a similar nature. Some time ago, there was a short story that appeared in *Analog*, whose title and author I do not remember, that treated the ramifications of "slow glass"—it retained images passing through it for a decade or so, and therefore containing the delayed record of crimes committed within the view of a pane of this author-invented material. Another was the story of an airborne unmanned surveillance vehicle that was programmed to detect and prevent acts that would result in "death." The machine, which had the power to terminate anyone who acted to cause death, preformed splendidly except for the inability to differentiate between human death and innocent acts, such as turning off a light switch that "killed" the illumination in the light bulb the switch regulated, and such.

There seem to be two fundamentally irresolvable difficulties with the idea of a "human black box" as a crime stopper: The first is the definition of *crime* and, the second, presuming that this could be universally established, is what the punishment would be for committing an infraction against the codified laws. I would imagine that, assuming the first two issues could be resolved, the probability of reaching an agreement to implant a recording device in every person born in this country (to limit the size of the problem to remote feasibility) in itself would be enormous and involve extremely difficult issues, such as what to do with individuals who are mentally deficient or have untreatable pathological faults.

Suppose, for the sake of discussion, a chip implant program were put in place. It would seem remote that everyone would understand what this process would mean to each individual or that would prevent careless or inadvertent transgressions against society. I have difficulty imagining what incentive would cause the newly implanted chip owners to refrain from "committing" a crime, knowing only that the great monolithic computer was recording their actions and that their recorded actions could be used against them. In brief, how would a punishment system work? Would every infraction be treated the same? Would only capital or significant "crimes" be considered as punishable? The chip monitoring system of human behavior seems doomed even in the philosophical stage as overwhelmingly complex.

Many stories have treated the consequences of being forced to always telling the truth. This does not mean that lying is good or cheating should be condoned, but that truth is shaded by human mental processes, making the definition of truth a subtle part of the system for judging the good or bad behavior of human beings. I would argue that recording the location and actions would be more trouble than benefit—and enormously complicated and difficult to make function. What I would think to be more effective and profitable for measuring and judging human behavior would be a better means to correct and simplify the rules of acceptable behavior (law) to reflect understandable limits. In other words, if the rules for behavior are as simple and unambiguous as possible, and the consequences of violating them clear, humans can be more likely capable of regulating themselves so as not to physically or emotionally harm each other.

Tom Davis
Chula Vista, California ■

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UPCOMING EVENTS Anthony Lewis

4–8 August 2005
INTERACTION (63rd World Science Fiction Convention) at Scottish Exhibition and Conference Centre, Moat House & City Inn Hotels, Glasgow, Scotland. Guests of Honor: Robert Sheckley, Jane Yolen, Greg Pickersgill, Lars-Olov Strandberg. Registration until 30 November 2004: Attending USD 170/GBP 95/EUR 145, Supporting USD 45/GBP 30/EUR 45; Child's USD 50/GBP 32/EUR 50. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Info: Interaction, 379 Myrtle Road, Sheffield, South Yorkshire S2 3HQ, U.K. or Interaction, P.O. Box 58009, Louisville, KY 40268-0009; info@interaction.worldcon.org.uk; www.interaction.worldcon.org.uk.

1–5 September 2005
CASCADIACON (North American SF convention) at Seattle Airport Hilton & Conference Center, Seattle, WA. Writer Guest of Honor: Fred Saberhagen. Artist Guest of Honor: Liz Danforth. Editor Guest of Honor: Toni Weisskopf. Fan Guest of Honor: Kevin Standlee. Science Guest: Marc Abrahams. Special Anime Guest: Hiroaki Inoue. Info: www.cascadiacon.org; webmaster@cascadiacon.org; Cascadia Con, Seattle NASFiC, Box 1066, Seattle WA 98111.

2–5 September 2005
DRAGONCON 2005 (Multi-media conference) at Atlanta Mariott Marquis/Hyatt Regency Atlanta, Atlanta, GA. Guests: Robert Jordan, Peter David, Larry Elmore, Bill Fawcett, Lorenzo Lamas. Registration: $70 until 15 July 2005, $85 thereafter. Info: www.dragoncon.org; dragoncon@dragoncon.org; DragonCon, Box 16459, Atlanta GA 30321-9998; (770) 909-0115; fax: (770) 909-0112.

9–11 September 2005
COPPERCON 25 (Arizona SF conference) at Embassy Suites Phoenix North, Phoenix, AZ. Guests of Honor: Robert J. Sawyer, Greg Keyes. Ghost of Honor: G. Harry Stine. Registration: $35 until 25 August 2005, $40 at the door. Info: www.coppercon.org; cu25@coppercon.org; CopperCon 25, Box 62613, Phoenix AZ 85082; (480) 945-6890.

16–18 September 2005
MIDWEST CONSTRUCTION IV (Midwest convention-running conference) at Sheraton Suites Country Club Plaza, Kansas City, MO. Info: masffc@kc.rr.com; Midwest Construction IV, c/o Margene Bahm, Chairman, Box 414175, Kansas City, MO 64141-4175.

23–25 September 2005
FENCON II (Texas SF conference) at Dallas-Ft. Worth, TX. Guest of Honor: S.M. Stirling. Filk Guest of Honor: Leslie Fish. Fan Guest of Honor: Randy Farran. TM: David Gerrold. Info: www.fencon.org; members@fencon.org.

Attending a convention? When calling conventions for information, do not call collect and do not call too late in the evening. It is best to include a S.A.S.E. when requesting information; include an International Reply Coupon if the convention is in a different country. ■

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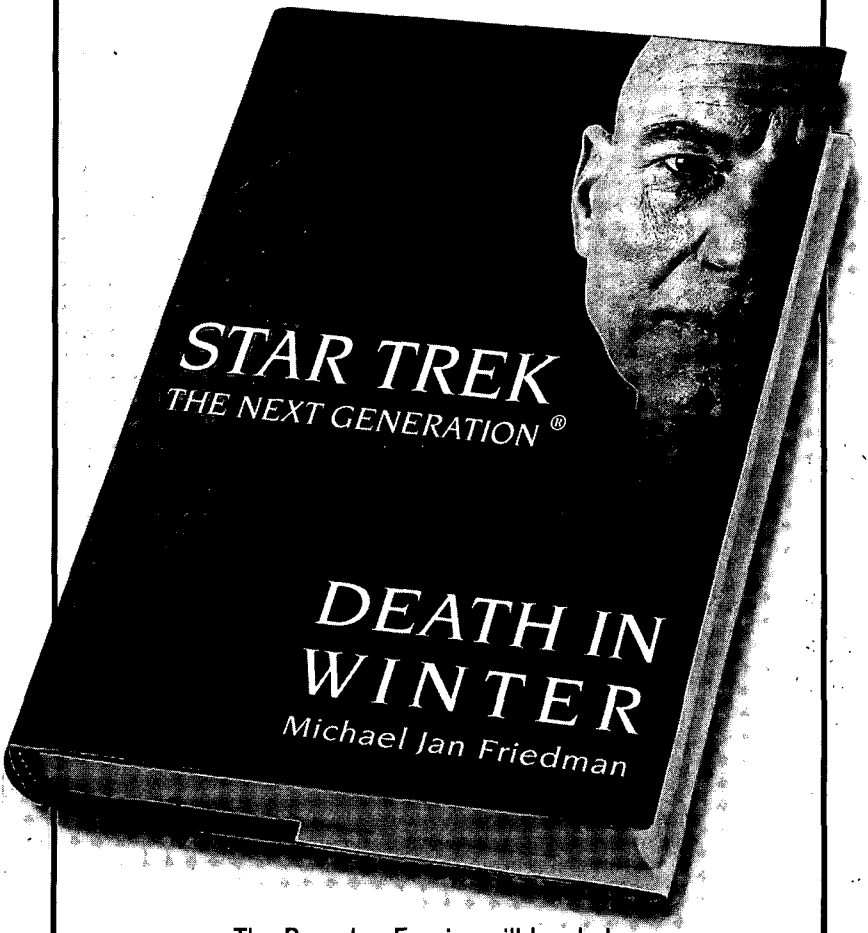

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